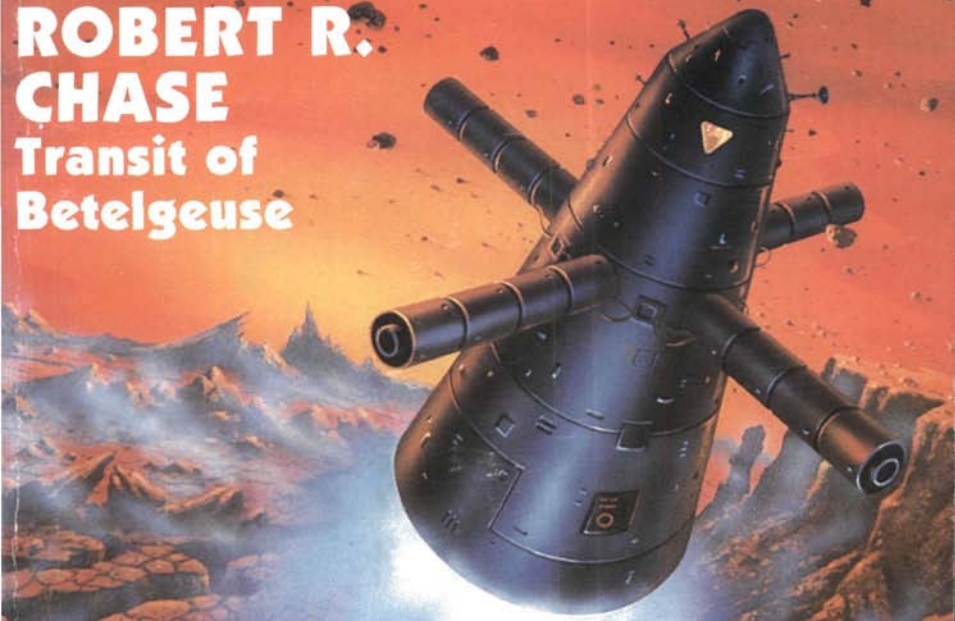
60TH YEAR

MAY 1990 $2.50 U.S. / $2.95 CAN.

SCIENCE FICTION analog SCIENCE FACT®

ROBERT R. CHASE
Transit of Betelgeuse



MICHAEL F.
FL
JE
O

*****5-DIGIT 94022
22RYD 21346 63F09X 28
66 FEB92 AFF
NA
HALSEY L ROYDEN
13466 3 FORKS LA
LOS ALTOS CA 94022

05
87168 3

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

AVON

"His eclectic enthusiasm adds sparkle to his new collection of stories."
The New York Times

"Fantastic concepts and characters...Zelazny is a clear, limber stylist and a generous, thoughtful soul."
People

ROGER ZELAZNY
FROST & FIRE

Hugo and Nebula Award-winning author • A collection of his finest short stories and essays

AVAILABLE FOR THE FIRST TIME IN MAY 1990 FROM AVON BOOKS

$3.50 ($4.95 in Canada)

AVON BOOKS
The Hearst Corporation

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

TOR PROUDLY PRESENTS

CHIMAERA'S COPPER

The bewitching sequel to
DRAGON'S GOLD and SERPENT'S SILVER

by

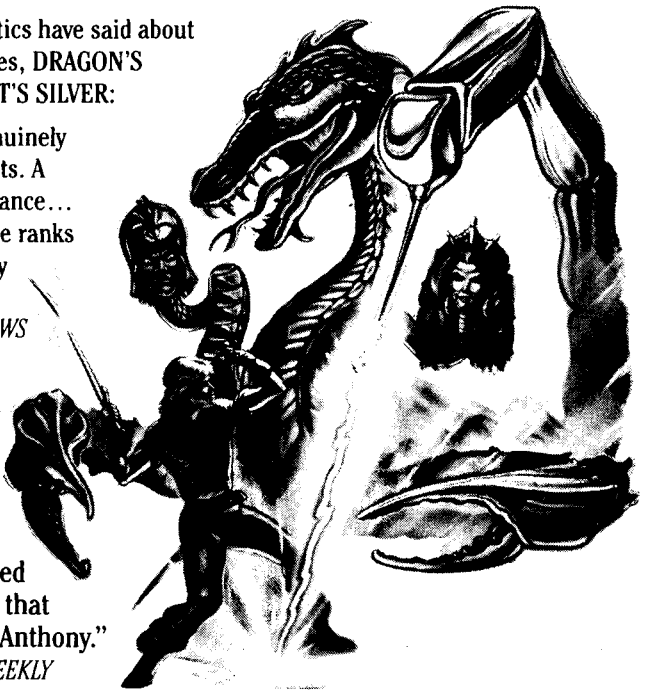
PIERS ANTHONY *and* **ROBERT E. MARGROFF**

Here's what the critics have said about the previous volumes, DRAGON'S GOLD and SERPENT'S SILVER:

"Spiced by some genuinely frightening moments. A persuasive performance... that should swell the ranks of Anthony's already huge audience."
—*KIRKUS REVIEWS*

"Action, character development, and romance blend nicely in this captivating tale."
—*KLIATT*

"Possesses the added irony and realism that one expects from Anthony."
—*PUBLISHERS WEEKLY*



CHIMAERA'S COPPER shows the mysterious unfolding of more of the prophecy of Mouvar—"Until from the Seven there be One, Only then will his Task be Done." Kelvin Knight Hackleberry, the Round-ear hero of the series, and his father, John Knight, find themselves shunted into an unknown frame of reality where amphibian warriors offer human sacrifice to the legendary Chimaera. CHIMAERA'S COPPER is the exciting and engaging continuation of the tale of Kelvin, an unlikely hero in the wildest of all possible multiverses.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

CIRCUIT'S EDGE

Another Killing in the Budayeen

"Lately, when there's a fresh stiff in the Budayeen, it seems like everybody wants to talk to *me* about it. And somebody wants to make me the next one....

"That's what it means to be a private eye in this pit of crime and corruption in the Middle East of the 23rd century. A friend to hustlers, lowlifes, thieves. With a brain wired to accept snap-in personality modules ('modules') and software add-ons ('daddies') that could save my life. Or end it."

CIRCUIT'S EDGE. The stuff of tonight's nightmares, in the ghetto of tomorrow. Available for MS-DOS computers—coming this summer for Amiga.

See your local retailer, or call 1-800-227-6900 to order.

Based on the Stories and Novels of George Alec Effinger

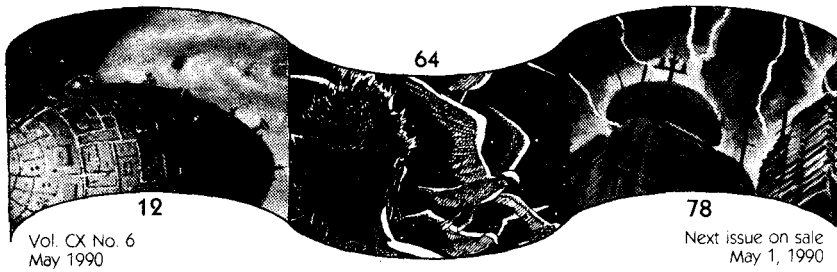
1989 Hugo & Nebula Award Winner

INFOCOM

© 1990 Infocom. MS-DOS is a reg. trademark of Microsoft Corp. Amiga is a trademark of Commodore-Amiga.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

analog



Vol. CX No. 6
May 1990

Next issue on sale
May 1, 1990

Novella

A ROSE BY OTHER NAME, Michael F. Flynn ____ 110

Novelettes

TRANSIT OF BETELGEUSE, Robert R. Chase ____ 12
THE SCOUT POST, Daniel Hatch ____ 78
TIME OUT, Jerry Oltion ____ 158

Science Fact

ASTROPHYSICAL ENGINEERING AND THE FATE OF THE EARTH, Martyn J. Fogg 53

Short Stories

EXTRA ELLIES, Julia Ecklar ____ 64
SLOW NIGHTS, Kevin D. Robinson ____ 104

Probability Zero

FITTING SUITS, Ben Bova ____ 75

Reader's Departments

THE EDITOR'S PAGE ____ 4
FUTURES, Matthew J. Costello ____ 63
THE ALTERNATE VIEW, John G. Cramer ____ 99
IN TIMES TO COME ____ 109
THE REFERENCE LIBRARY, Tom Easton ____ 177
BRASS TACKS ____ 185
THE ANALOG CALENDAR OF UPCOMING EVENTS ____ 192

Cover by David Hardy

Joel Davis, President & Publisher

Stanley Schmidt
Editor

Tina Lee
Managing Editor

Indicia on Page 6

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Editorial

EXTRAPOLATIO AD ABSURDUM

Stanley Schmidt

There is a classic form of argument (actually a *family* of forms of argument) well known by the name *reductio ad absurdum*. The basic idea is that a false proposition is proved to be such by logically deducing from it an absurd consequence. If *A*, then (by deduction) *B*; and since *B* is known to be false, *A* must be false.

For example, having never actually measured a giraffe, I might make the proposition, "All giraffes are 6 inches tall." But I have measured myself, and I know I'm 70 inches tall. I also know that 70 is greater than 6, so if my proposition is true, it follows logically that I am taller than any giraffe. I've stood near many giraffes and they've all been taller than I am—an observation contradictory to the conclusion deduced from my proposition. Therefore the proposition must be wrong.

That example, of course, verges on the frivolous; but some form of *reductio ad absurdum* has been the key to establishing the truth or untruth of many less obvious propositions. In mathematics, for example, theorems are sometimes proved by "indirect proof," which consists of assuming they are *not* true, and then deriving from that a conclusion known to be false.

In popular parlance, the term *reductio ad absurdum* (like most terms in popular parlance) has tended to be used loosely, to describe anything carried to extremes. There is one particular type of argument along those lines that I see so often, especially in ethical and political contexts, that I think it deserves a name of its own, for which I propose *extrapolatio ad absurdum*. The idea here is to argue against a proposed course of action by saying that if people are allowed to do a particular thing, pretty

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

soon they will surely do a much more extreme version of it, and therefore the original thing must not be allowed. "If *A*, then (frequently by assumption rather than by any logic at all) **A!**" If we let them do that, they may do more than that; therefore we mustn't let them do *anything*."

Why do I call it *extrapolatio ad absurdum*? First, it involves extrapolation—drawing a conclusion about "what will happen if this goes on." Second, that conclusion often has little or no logical connection with either the original proposition or what would really happen under the assumed conditions.

You want examples? Read your newspaper (with special attention to the editorial page, including both editorials and letters to the editor). Read the *Congressional Record*. Read my mail at *Analog*. Listen to campaign speeches and debates. Since I don't want you to go and do that right now, I'll supply a few here to get you started.

A reader sent me a clipping by a sociologist apparently scared to death of the idea that DNA "fingerprinting" can be used to identify perpetrators of crimes, because its use might gradually be extended to routine files on not only violent but nonviolent criminals, and then everybody, and so on. He takes it all the way to the denial of employment and the right to have children on the basis of "substandard" genetic makeup—not impossible, but surely a far cry from use as a forensic tool for serious crimes.

You have surely heard anti-abortionists argue that if people are allowed to abort one-month fetuses, that's only a first step toward infanticide and ultimately routine extermination of whatever category of people is unfashionable with the current government. You may have heard a somewhat similar argument from pro-choicers, to the effect that if a one-month fetus can be declared fully human, that's just one step toward "full humanity" for isolated sperm cells.

I recently proposed (in my August 1989 editorial, "Job Qualifications") that people be required to demonstrate a very basic understanding of scientific and technological principles as a prerequisite for voting, because without it they can have no understanding of many of the issues they'll be voting on. I was promptly deluged with horrified letters informing me that if we required basic competence in a basic field or two, the next thing would be to require doctoral-level familiarity with every conceivable field, or to base voting rights on a competency exam in Creation Science or whatever intellectual charlatanism is currently in vogue with some ruling class.

And so on.

Now, please note carefully that I'm *not* saying that any of these extreme extrapolations can't happen. History has given us ample reason to believe that any of them *can*. The fallacy is the assumption that they *must*. The implicit false premise used to "derive" the conclusion that we must do nothing, lest we do too much, seems to be that human beings are intrinsically incapable of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

doing anything without doing it in its most extreme form.

That, I think, does us an injustice.

Since DNA fingerprinting *could* lead to massive social abuses, we are told, we shouldn't let it be used even to identify a mass murderer who's killed 27 people so far and is still terrorizing a million others. Since allowing abortions in some cases *could* lead to allowing it in more, and perhaps by insidious steps even the killing of individuals already born, we are told that they must not be allowed under any circumstances at all. Since *forbidding* abortions in some cases might lead to forbidding them in more, we are told that they must not be limited in any way. Since attempts to require competence of voters could lead to abuses and excesses, we are told we must not attempt to require it at all. Better to let our world continue to be run by decision-makers who have no idea what they're doing.

STANLEY SCHMIDT ..... Editor
TINA LEE ..... Managing Editor
IAN RANDAL STROCK ..... Assistant Editor
TERRI CZECZKO ..... Art Director
ANTHONY BARI ..... Junior Designer
CAROLE DIXON ..... Production Director
CYNTHIA MANSON ..... Director of Marketing and Subsidiary Rights
FLORENCE B. EICHIN ..... Manager, Contract & Permissions
VEENA RAGHAVAN ..... Director, Special Projects
CHRISTIAN DORBANDT ..... Newsstand Marketing and Promotion Manager
DENNIS JONES ..... Newsstand Operations Manager
ELIZABETH BEATTY ..... Circulation Director
BRIAN McKEON ..... Corporate Business Manager
A. BRUCE CHATTERTON ..... Advertising Director
LISA FEERICK ..... Advertising Coordinator
IRENE BOZOKI ..... Classified Advertising Manager

Published since 1930.

JOEL DAVIS
President and Publisher

CARL BARTEE
Vice President
Manufacturing

JOE DEFALCO
Vice President
Finance

First issue of *Astounding* January 1930. ©

ADVERTISING OFFICES
NEW YORK
(212) 557-9100

Analog Science Fiction/Science Fact (Astounding) is published every 28 days with a special issue in January and at year end by Davis Publications, Inc. at $2.50 a copy in U.S.A., $2.95 in Canada. 1 year subscription for $33.95 in the U.S.A. and possessions, in all other countries, $38.65 payable in advance in U.S. funds. First copy of new subscription will be mailed within eight weeks of receipt of order. When reporting change of address allow 6 to 8 weeks and give new address as well as the old address as it appears on the last label. Second-class postage paid at New York, NY, and at additional mailing office. Canadian 3rd class postage paid at Windsor, Ontario.

© 1988 by Davis Publications, Inc., all rights reserved. Protection secured under the Universal Copyright Convention. Reproduction or use of editorial or pictorial content in any manner without express permission is prohibited. All stories in this magazine are fiction. No actual persons are designated by name or character. Any similarity is coincidental. Printed in U.S.A. All submissions must be accompanied by stamped self-addressed envelope, the publisher assumes no responsibility for unsolicited manuscripts or artwork.

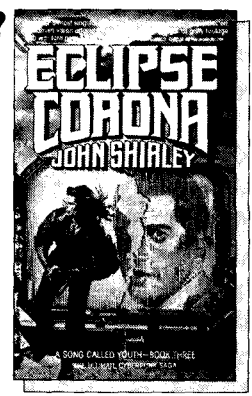
POSTMASTER: SEND to ANALOG SCIENCE FICTION/SCIENCE FACT (ASTOUNDING) P.O. BOX 7061, Red Oak, IA 51591
IN CANADA RETURN TO 1801 SOUTH CAMERON, WINDSOR, ONT. CANADA N9B 3E1
Editorial and Advertising: Analog Science Fiction/Science Fact, 380 Lexington Avenue, New York, NY 10017
Subscriptions: Analog Science Fiction/Science Fact, P.O. Box 7061, Red Oak, IA 51591 **ISSN 0161-9328**

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

NEWS FROM Questar
SCIENCE FICTION/FANTASY

WHO WILL SAVE THE WORLD FROM *ECLIPSE CORONA*?

The long-awaited third volume in John Shirley's epic Cyberpunk trilogy, *A Song Called Youth* is here at last!



Second Alliance has Europe in a death grip, and New Resistance is not in place to fight back. It's just the beginning of ECLIPSE CORONA, a master plan of genocide designed to wipe out entire races and make room for subhuman slaves. All hope depends on a girl who knows nothing—but whose brain knows too much. And neither the SA nor NR realizes that an orbital psychotic is about to solve all of Earth's problems by killing...

"One of SF's most singular talents...Shirley's apocalyptic, pop-inflected, rock-driven vision attains a new degree of clarity against gritty footage of a war-torn near-future Europe." —William Gibson, author of *Neuromancer*

"John Shirley's prophet-in-the-cyberwilderness voice deserves high billing among the best." —Roger Zelazny, author of the *Amber* series

Cover art by Barclay Shaw
0-445-20510-5/$4.95
(In Canada: $5.95)

POPULAR LIBRARY

Also read
Eclipse
0-445-20506-7/$3.50
(In Canada: $4.50)

Eclipse Penumbra
0-445-20508-3/$3.95
(In Canada: $4.95)

At Bookstores Everywhere

Also this month: *MORIGU: THE DEAD* by Mark Perry

Margawt, the Morigu, continues his neverending fight against the shadowlord as the battle begun in *Morigu: The Desecration* rages on.

The warlords of the alliance seek to strike back at their enemy, but it is the Morigu, Nature's passion, who is destined to soothe the shattered land with a sea of blood. They are warriors of a holocaust without boundaries, war with no quarter—for the prize is the living soul of the world.

Cover art by Gary Ruddell
0-445-20644-6/$4.95
(In Canada: $5.95)

POPULAR LIBRARY

At Bookstores Everywhere

A WORD FROM Brian Thomsen

Without television our lives would be radically different. We would never have been treated to the up-to-the-minute/you are there reportage of Vietnam, the moon landing, or Watergate.

He who controls the information controls the masses. This is just one of the the issues in John Shirley's *A Song Called Youth* trilogy, which climaxes with ECLIPSE CORONA, and it's the next terrifying step after Orwell's Big Brother TV.

Television has always been a part of my life, whether it's a PBS adaptation of "The Lathe of Heaven" or just another "Star Trek" rerun. When you see me around, let's talk about the upcoming crop of movies for the summer.

© Popular Library 1988

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Sure. And while we're protecting ourselves against every possible abuse along those lines, we'd better outlaw surgery, too. After all, let a few people start cutting diseased appendixes with scalpels, and the next thing you know everybody and his second cousin will be going around lopping off healthy heads with hacksaws just for the fun of it. . . .

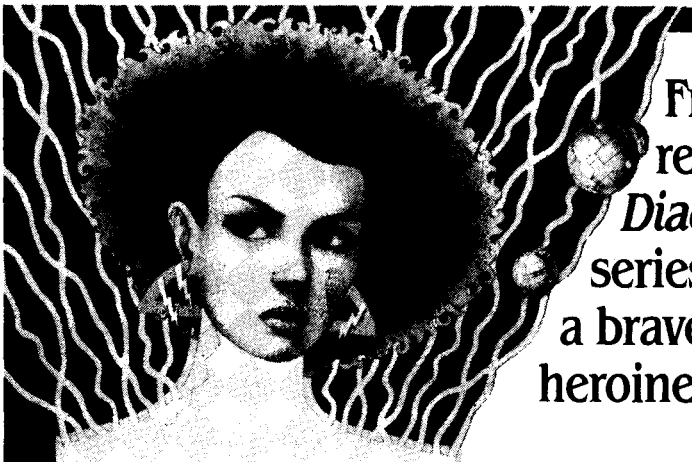
You recognize that one as absurd (I hope!) because surgery has been around for quite a while, and almost certainly you or someone close to you has benefitted from it. The judicious cutting of diseased tissue has *not* led to the indiscriminate lopping of all flesh, healthy or un. You may be more doubtful about some of my other examples because they're relatively new, and it remains to be seen how they'll work themselves out. But in thinking about them, we might do well to keep the surgery example in mind as empirical proof that people do *not* always *have* to do things in the most extreme possible way. Doing nothing is *not* always the best course in an area where excessive action could be dangerous. As John W. Campbell was fond of saying, "Behold the tortoise: he maketh no progress unless he sticketh out his neck."

But *carefully*. The tortoise sticks his neck out just enough to see who's out there before he goes much farther. We, too, can and must proceed carefully—but sometimes we must proceed. Sometimes doing nothing is as serious a danger as doing too much; and in those cases we need to try to learn how much, of what, we *should* do, and then do that and no more.

The "no more" part requires that we keep in mind that while people don't *always* or *necessarily* carry things to extremes, they have demonstrated repeatedly that they *can* and sometimes *do*. I have warned against it myself, in another editorial ("Acid Raindrops," February 1985). It is true that people, and especially governments, having gotten away with one thing, frequently try to get away with a little more. But the assumption that they will always try to get away with as much as possible—and that they can't be prevented from it—does not constitute a valid proof that *nothing* must be done. Certainly it is a danger to be guarded against, but how much restraint that requires at the outset depends on how *likely* the extrapolated behavior is. That must be determined by evidence other than the mere assumption that people will always act in the most extreme way possible.

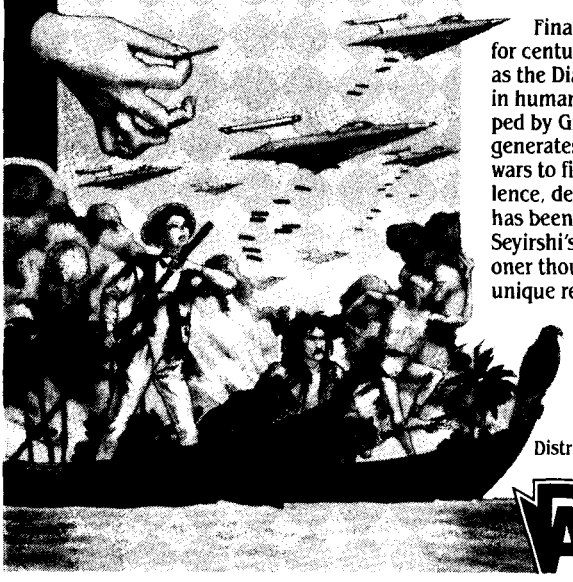
The vast majority of people don't *want* to go around sawing their neighbors' heads off, and are more than willing to cooperate with laws forbidding it. Therefore that's not a danger people worry about much in connection with surgery. The examples I talked about in "Acid Raindrops," on the other hand, involved censorship and other government limitations on purely personal freedom. That's a specific area in which virtually every government in history has at least occasionally shown a strong tendency to seize more and more power in insidious steps. That

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



From the renowned *Diadem* series comes a brave new heroine

JO CLAYTON
SHADOWPLAY



Finally freed after being captive for centuries in the alien artifact known as the Diadem, Shadith is once again in human form—only to be spacenapped by Ginbiryol Seyirshi, a being who generates devastating interplanetary wars to film and sell the resulting violence, destruction, and death. Shadith has been chosen for a key role in Seyirshi's newest "production." But prisoner though she is, Shadith has some unique resources of her own, and with her Diadem-mastered powers, she plans to rewrite the script —and put an end to Seyirshi's interstellar reign of terror!

Distributed by NEW AMERICAN LIBRARY

$4.50

DAW

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

demonstrated tendency, not the mere fact that extreme actions are possible, is why it's prudent to resist even small steps *in that particular area*.

I tend to oppose all forms of government or government-sanctioned censorship, not because I think people can *never* be trusted not to do more and more extreme things, but because (a) they've repeatedly demonstrated such a tendency *in regard to the expression of ideas*, and (b) no one has ever come up with objectively defensible bases for defining the limits, except in such very special cases as yelling "Fire!" in a crowded theater. I do *not* oppose all forms of cutting of living human flesh, because (a) some forms of it are very beneficial, and (b) it *has* been possible to come up with, and enforce, objectively defensible ways to define which kinds are beneficial and which harmful.

I hope, as we consider such new options as genetic engineering and large-scale environmental controls, that enough of us will have the good sense to recognize that doing *either* too much *or* too little can be dangerous, and that what constitutes too much or too little depends on the case at hand. By all means, in starting down any road, let's be keenly aware that sometimes people tend to go too far. But let's not forget that sometimes they *don't*, either because they don't want to or because some means is established to make sure they can't. ■

1990 CLARION WORKSHOP

The 23rd Clarion Workshop in Science Fiction and Fantasy Writing will be held from June 24th to August 4th at Michigan State University.

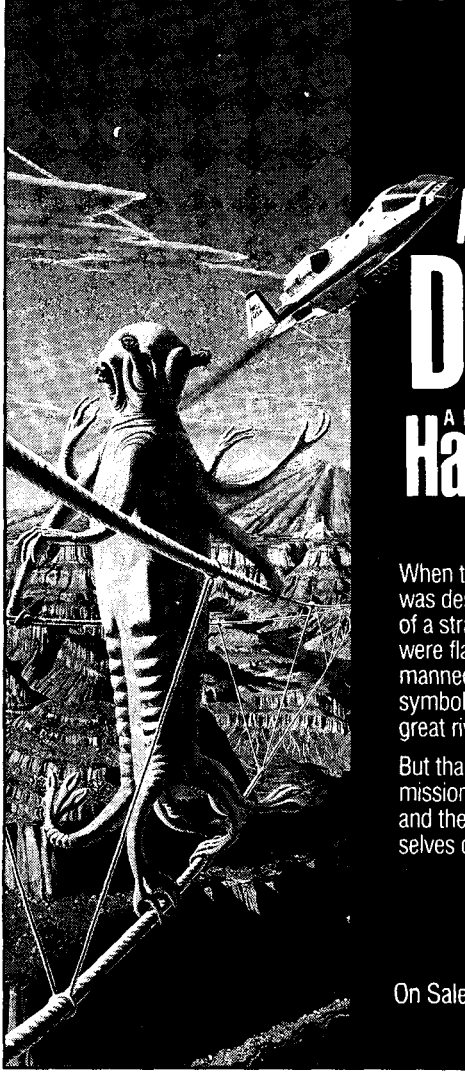
Writers-in-Residence will be James Patrick Kelly, Joyce Thompson, Connie Willis, Michael Kube-McDowell, Kate Wilhelm and Damon Knight.

Clarion is the oldest and most successful writing workshop in the science fiction and fantasy field. Over a third of its graduates have since published, among them Ed Bryant, Michael Talbot, Octavia Butler, Vonda E. McIntyre and Kim Stanley Robinson.

For applications or further information, write to Professor Albert Drake, Director, Clarion '90, Holmes Hall East, Lyman Briggs School, Michigan State University, East Lansing, MI 48824-1107. Application deadline is April 1, 1990.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The spectacular new sf adventure from the author of *Noninterference* and *Kaleidoscope*!



A WORLD OF DIFFERENCE

A NOVEL BY

Harry Turtledove

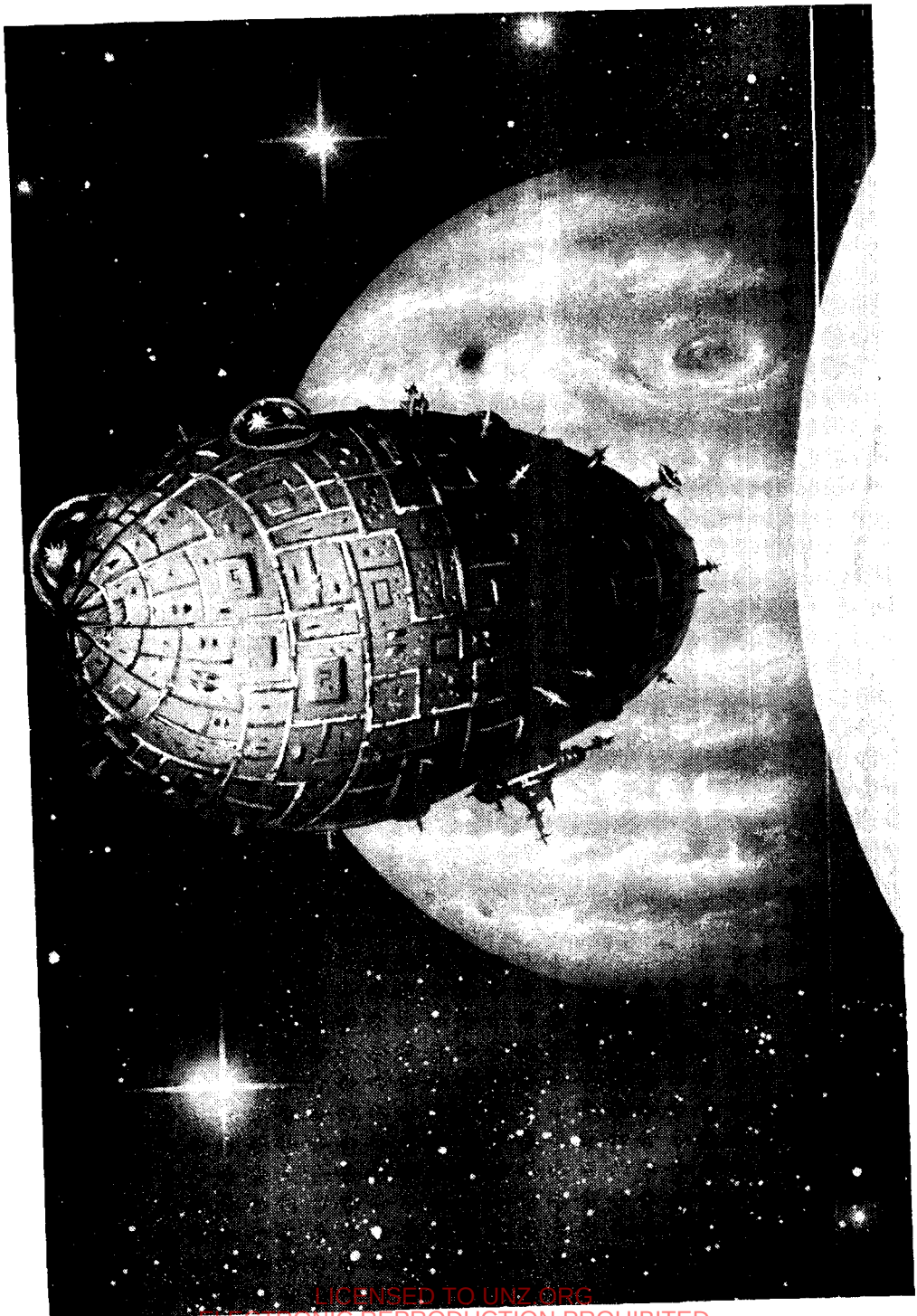
When the Viking lander on the planet Minerva was destroyed, sending back one last photo of a strange alien being, scientists on Earth were flabbergasted. And so a joint US/USSR manned space mission was mounted—a symbol of the new peace between the two great rivals.

But that peace was threatened when the mission landed in the middle of an alien war, and the Americans and Soviets found themselves on opposite sides!

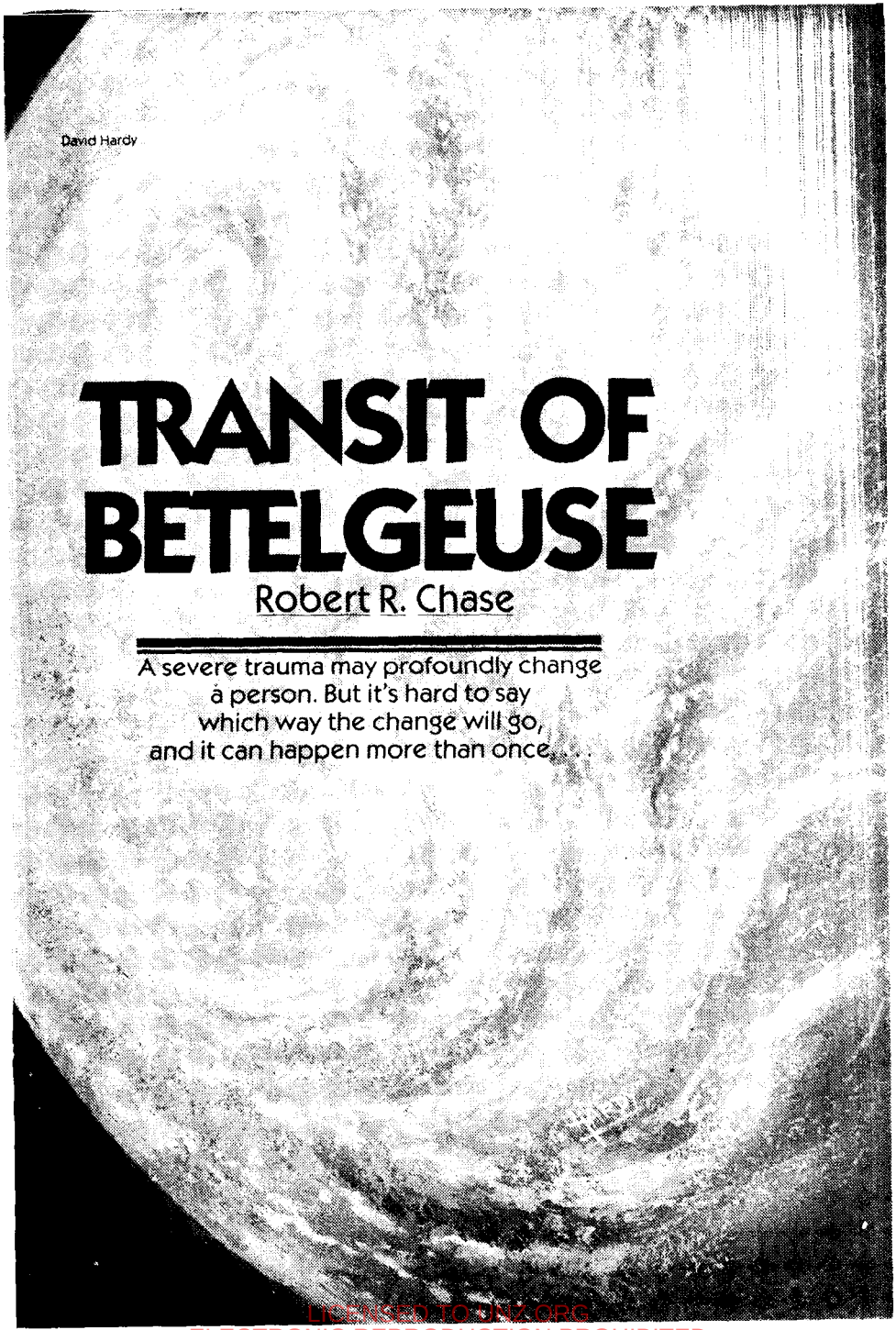
On Sale in May

DEL REY #1 in Science Fiction and Fantasy
Published by Ballantine Books

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



TRANSIT OF BETELGEUSE

Robert R. Chase

A severe trauma may profoundly change a person. But it's hard to say which way the change will go, and it can happen more than once. . .

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

1. Oxygen

"Your name, please?"

My hesitation is barely perceptible, just enough for Dr. Youvan's eyes to widen with the beginnings of alarm.

"Alexander Raymond," I answer crisply. Youvan's shoulders sag with release of tension as she keys in the answer.

"Citizenship number."

"CM9801-NN-A0815." No hesitation this time.

She goes through the rest of a list of standard orientation questions. I answer automatically. The mask is cool on my face. It monitors body heat, electrical conductivity of the skin, and even, especially, picks up brain wave patterns. A technician watches the readouts attentively, looking for a lapse, a weakness, a tell-tale of unraveling self-destruction.

"You are a Centauran, I see. Do you think Rascavia will be able to defeat the Reformist movement and maintain control of the Inner Council?"

"I have no idea. Politics bores me."

Youvan grunts. For me, at least, that is the correct answer.

Memory checks. Logic problems. Tests of smell and hearing, color and depth perception.

Small shocks from metal circles stuck to forearms and thighs make me twitch. The reactions must please her. She tells me that I may stand up from the power chair which has brought me down the corridor from the catacombs.

At her direction, I pace four strides to the nearest wall. As I turn, I glimpse myself in the large monitor. My body is an intricate maze of light. Blood pulses through my circulatory system, fading from fluorescent crimson to robin's egg blue. Sympathetic and parasympathetic nervous systems glow two different shades of Christmas tree green.

"Heads up!"

The spheroid comes in *hard*. My left hand grabs it out of the air. The palm smarts with the sudden slap of metal on flesh. I heft it, wondering what you use a ball bearing this size for on a battlestar. Even one which has been converted to a research vessel. I toss it back to her.

"Very good. How do you feel?"

I consider. "I feel cold."

Youvan smiles for the first time. "Under the circumstances, that is quite understandable."

You can cheat Einstein's universe, but only if you are willing to pay the price.

Take any volume of space. Stress it with a million times its ground state of virtual energy, taking care not to let any of it leak into surrounding space. If you balance the stresses just right, everything in the sphere will jump to a higher quantum state. $Space_2$. Everything loosens up. Inertia withers away. The speed limit of this new universe is the equivalent of four times the speed of light in normal space, $Space_1$.

The down side is that everything becomes *too* loose. Body heat boils the blood. Arteries shred from the pounding of the pulse. Your ship melts around you like a Salvador Dali watch.

So you energize suppressor fields. In normal space, their effect is to petrify time. Here the effect is to create a small

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

bubble of viability for the human metabolism. As you jump further up the quantum ladder, the suppressor fields must be stronger. In $Space_4$, even the best suppressors let through some distortion. Years later, this contortion of subatomic structure may manifest itself as cancers, blossoming throughout the body.

Effects on machinery are more immediate. Minor distortions randomly delete/add bits and bytes from computer memory. You emerge into normal space 50,000 kilometers from your calculated reentry point. So you always figure the necessary margin and triple it.

A major distortion, affecting the quantum drive itself, can boost you into $Space_5$. For a millisecond. Then everything cascades down the quantum ladder, emerging into $Space_1$, normal space, as a ball of plasma exploding at a substantial proportion of the speed of light.

So the operational speed-limit of the multiverse is set by $Space_4$, 256 times light-speed. Even at that velocity, it still takes two and a half standard years to traverse the 650 light-year distance to Betelgeuse. More, actually, with the time surfacing in $Space_1$ for the engineers to check and recalibrate the quantum drive. And for a few doctors to be unfrozen to check the engineers to see if they need recalibration.

(I am arrested by the image of them moving through the empty metal corridors of the starship, like insects in some involute mechanical shell.)

Like most of the *Endeavor*'s complement, I was not unfrozen. I stayed in cold sleep, my temperature a long decimal, an almost meaningless distinction from absolute zero. Nerves, even parts of bone and muscle, become superconductors. Residual electrical charges flow round and round this brittle, tremendously expanded brain.

There is no reason why one should not experience a form of consciousness in this singular state. Some test volunteers reported impressions of inexpressibly extended thoughts, of odd, phantasmal dreams . . .

I, of course, did not. I never dream.

Artificial dusk shrouded the bridge, making the read-outs blink with an extra crispness. Velcro, unnecessary while under acceleration, crackled beneath my feet like autumn leaves.

The far wall was a star field, reproduced so realistically that I wanted to brace myself against a sudden gust which might puff me out into the vacuum. Centered in the holo-screen was a raw, red wound. Even at five light-years, it washed out the rest of the stars. It was blurred in a haze of its own creation. Even so, it was clearly oblate.

"Iceman!" Wagner's voice rumbled with an abrasive chuckle. "Welcome back to the land of the living. Big things are happening. Tell me what you think of this."

He threw a shattered rainbow onto the console next to me. I picked up the thin strip of film. Blocks of color shading into each other, pierced with lines of pure darkness.

"Neon and . . . oxygen," I said.

Wagner raised bushy eyebrows. "You see, Elsa? I told you the Iceman would not need Cencom computer to read that spectrum."

"No trick to that when you *are* a computer," Elsa Zenner muttered. Brown

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

eyes flashed resentfully over the bridge of a thin, sharp nose. Michele Freschetti's head turned abruptly, as if she were about to object. If so, she thought better of it.

I ignored all of this, as I have ignored similar jabs, to the effect that my blood is made of frozen prisms, in the past. Once, almost any serious astonomer would have been able to read spectra himself. Now it is an eccentric anachronism, like making leaded stained glass.

Yet, surely, even the most computer-bound theorist should have considered the possibility of finding this spectrum.

"How long?" I asked.

"You go to the heart of the matter," Wagner said, his voice gruffly serrated. "The automatics did take readings each time we reemerged into normal space. However, despite the self-checking routines in each of Cencom's seven main parallel units, the address to these files has been lost. Quantum distortion. Lieutenant Horner assures me that these files will be found. Soon."

His gaze fell on the workstation of a young crewman, busy with light-pen and throat mike. Up until this point, the dozen members of the ship's crew on the bridge had performed their duties with such quiet efficiency as to be almost in a separate world from the astronomical contingent. The lieutenant in question colored and set her lips in a straight line, but gave no other indication that she had heard the comment.

I tried another tack. "How much oxygen is there? How far does it extend into the halo?"

"We don't have enough data yet for a mass estimate," Wagner said.

Crawford looked up from his observation station. As our senior member, he had always seemed to me to be the natural leader of our contingent, but he had never asserted himself. He seemed to find the perpetual power struggle between Zenner and Wagner distasteful.

"However," he said, "we can tell that the oxygen extends out at least three AUs."

Betelguese had been fusing carbon into neon for as long as astronomers had been taking measurements, maybe as long as 6,000 years. Within the recent past, the supply of carbon had become inadequate to sustain the weight of the star, as hydrogen and helium had millions of years before. Now . . .

Crawford gave me a wintry smile. He had been watching me think. "You are right. Five lights from here, things may be getting very interesting."

The captain's table gleamed, sterling silver on white linen. Water beaded on cut crystal. A midshipman in dress whites served small plates of cold shrimp.

Captain Kalfus sat at the head of the table, almost dwarfed by the huge oil painting behind him. An idealized Captain Cook and a sailor stand alongside a longboat—arguing, bargaining?—with a group of four Tahitians. His *Endeavor* lies at anchor in the bay behind him, looking small in the distance.

Kalfus looked as pleased with himself as his concept of military propriety would permit. He raised his glass. "To Earth's—to all humanity's triumph in this voyage, which has already extended our presence in the galaxy ten times farther than any previous journey."

We drank. "I'll feel a lot more festive

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

when we get back within the Periphery," Zenner grumbled.

Kalfus grinned. There was real amusement in his smile, but there was steel as well, as if facial expressions were the weapons of choice in his career.

"Just by surviving this far we have confounded our severest critics. And if we indeed do not make it home," he said, gesturing to have his glass refilled, "then it would be a waste of an excellent champagne not to enjoy it now.

"Wouldn't you agree, Dr. Raymond?"

I gave a perfunctory nod. "How soon will we get in-system?" In-system had been defined, somewhat arbitrarily, as forty-eight AUs, the distance to the dwarf companion star.

Kalfus' eyes narrowed, probably at what he perceived as a lack of social grace. "That depends entirely on the reports I receive from Dr. Youvan, on how well we have survived 250 light-years in Space$_4$, and from Mr. Fu and his engineering section. Dozens of minor distortions in our quantum drive have manifested themselves since our last surfacing. We go nowhere until Mr. Fu tells me it is safe to do so. Especially since the rumors I hear from the astronomical contingent suggest that we may have to depart the vicinity very quickly."

"Betelgeuse is fusing neon into oxygen," I agreed.

"So I hear," Kalfus said. "However, I must admit that I do not fully understand the significance of that fact."

I hesitated, half-expecting some other member of the team to interrupt. Nobody did. Freschetti and Crawford were probably too polite. As for Zenner and Wagner, they must have realized that I was faced with the choice of being arrogantly obscure or pedantically long-winded. Being unsure of my audience, I opted for the latter as the safer course.

"Betelgeuse is a younger star than your Sol," I began, "but, because it is much more massive, it is correspondingly further along its evolutionary sequence. Sol has been fusing hydrogen into helium for nearly all of its life, and will continue to do so for several million more years. Betelgeuse burned through most of its hydrogen and helium a long time ago. For as long as anyone has been keeping measurements, it has been sustaining itself by fusing carbon to form neon.

"Recently—we can't be sure how recently because of a malfunction in the computer memory—Betelgeuse exhausted most of its supply of carbon. It began fusing neon into oxygen. This raised the internal temperature from 620 million degrees to about 1.3 billion degrees.

"More importantly, it vastly compressed the time scale for the rest of the star's life. Hydrogen and helium lasted for millions of years. Carbon sustained the star for only six thousand. Now that neon is fusing into oxygen . . . "

"Yes?" Kalfus prompted. The entire room had become still.

"That can continue for a total of no more than seven years. That is why it is so important for us to discover when oxygen began to be produced. Oxygen itself will fuse for no more than one year. Its product will be silicon. The temperature will rise to three billion degrees. In three days, the silicon will turn to iron."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Then?"

I shrugged. "That's the end. Iron can't fuse into heavier elements, since that reaction consumes more energy than it produces. Once the amount of iron reaches the Chandrasekhar limit —about 1.4 the mass of Sol—it becomes too heavy to sustain the weight of the star. It collapses. Then splashes back out."

Kalfus leaned back. "I . . . see. In that case, you astronomers will become the most important members of this mission. Except, of course, for Mr. Fu, who will make good our get-away."

"A pretty lecture, Iceman," Wagner said, as I left the ship's mess.

I turned, waiting for a challenge, or a barb. "Did it not seem adequate to you?"

"What was inadequate was the fact that it was called for at all. Here we have voyaged all this way to the only star within a thousand light-years that has any chance of going supernova within the next ten thousand years, and the terrestrial commissioners neglect to brief their brightest young officer on the danger signals which would indicate that we are all about to be blown out of the sky."

The curly hair surrounding his bald spot shook with irritation. "Not that I should blame even them. They have been gulled by a dogma which insists that it would be impermissible coincidence for our life-times to intersect any natural occurrence of scientific interest.

"However, I do blame you for delivering that lecture as if astronomy were even of secondary importance in this mission. I have as much, some would say considerably more, ego as any other man, but at least I have the sense to know when I'm in charge and when I'm only window dressing."

"What do you mean?" I asked, hoping that my confusion was not too obvious.

Wagner looked at me for a moment, as if weighing something. "Let me explain it in the saloon. Please."

The saloon was a romantically-named, overly-bright automatic food dispensary. Wagner found a booth across from a couple of off-duty engineers. I sagged into the padded seat. The vestiges of resuscitation shock manifested themselves in a sudden weariness.

"The first thing to understand," Wagner said, "is that none of us was chosen to be part of the astronomical contingent as a mark of the esteem in which we are held by our colleagues. For longer than I like to remember, fieldwork has been the province of graduate students. Weren't you taught that real astronomy is done with gravitational lenses and computers?"

"I have heard that opinion," I said. "From fools. It is one which does not seem to have impressed the terrestrial commissioners. It took a substantial commitment of funds to refit this battlestar with Near Absolute coldsleep cubicles, an expanded infirmary, sevenfold redundancies in quantum drive and computer systems.

"For that matter, Kalfus and Fu do not impress me as second-rate officers. Everything is consistent with Earth being completely behind the purpose of this mission."

"Agreed. But what is the purpose of this mission?" Wagner puffed a pipe

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

into life. Together with his beard and eccentric hair, and despite his height, it made him more closely resemble a dwarf than a scientist on the cutting edge of his profession.

"Kalfus and Fu are interesting cases. They are both highly skilled and ambitious. They know, as every other military member of the ship's company knows, that however great the blessings of the recently concluded peace with the Bestials, it means that from now on the chances for distinction, for glory, for promotions, will be few and far between. Therefore, the opportunity to be part of an expedition which will extend humanity's reach ten-fold must be grasped with all the strength they have."

"Why should the terrestrial commissioners subsidize their ambitions?" I asked.

"That is the interesting thing," Wagner said, smiling slyly. It didn't fit well on his face, making him look like an obese fox. His fingers played quickly over the menu buttons. An almost imperceptible *whirr* and bump and the wall portal slid open, disclosing a small, potent-smelling concoction for Wagner and a bulb of carbostym for myself. Wagner's idea of a dig at my teetotaling.

Maybe you have no demons worth imprisoning, Wagner. Or maybe you just don't care if they tear loose.

I took the bulb, twisted the top off, converting the bottle into a drinking glass.

"Partly, it's wounded pride," Wagner said, meditating over his glass. "Ishige ran at the Battle of Chiron. That's what children will learn hundreds of years from now about the Bestial Wars. Not the reason for his orders, not the necessity of preserving a fleet to protect Sol, not that Sky Marshall Ishige resigned his commission in protest. They will learn that the Terrestrials ran and the Centaurans won the battle without them. Earth needs something heroic to restore its self-respect.

"Then there's something even more important. Power. The war may have been declared a stalemate officially, but if you take the long view, Earth lost. It lost influence with the colonies, it lost control of its slave race of Bestials—most importantly it lost the Periphery."

Imagine you are God, looming over that small section of the Orion Arm of the Milky Way which the human race has explored. Plant one point of your William Blake calipers in the moderately sized G2 star which is Sol and swing the other with a radius of, say, twelve light-years. (Being God, you can afford to approximate.) When you have completed the circle, draw another one at right angles to the first. Within the sphere are the familiar, settled star systems: Alpha Centauri, brilliantly searing Procyon and Sirius, Epsilon Eridani, a clutch of small, M-type stars scattered like dully-glowing rubies.

Beyond these lie the Periphery, sparsely inhabited by venture capitalists, anchorites, and those genetic-variants referred to in impolite society as Bestials. Bred for endurance of the extreme conditions of the stellar frontiers, they had been used for work too demanding and dangerous for non-modified humans, too expensive or unpredictable for machines.

The peace had left them in control of star systems with exotic-sounding names: Eta Cassiopeiae, Groombridge, the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

MAIL ★ ORDER ★ MALL

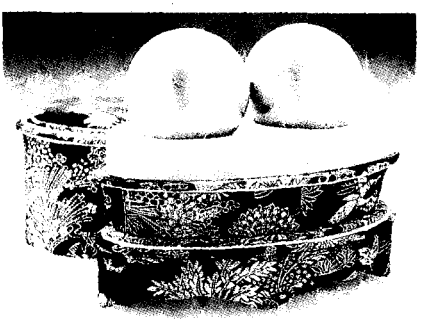
▼ BACKJACK CHAIR

Versatility, comfort and convenience all in the new BackJack Chair. Upright, it's a firm back rest, for sitting, studying or reading. Flip it over and you have a recliner with a cushion headrest — perfect for TV watching or just relaxing. Extremely well constructed, BackJack features a tough zinc-plated steel frame. The seat boasts a polyurethane foam cushion and a removable cover crafted of all cotton army duck that is water repellant and mildew resistant. So now there's a chair for any room in your house — or take it along when you head for the beach, pool or campsite. **$26.98** ($6.00) #A1938-Red, #A1939-Blue, #A1940-Tan.

▼ WORDFINDER™

The worlds smallest and smartest electronic dictionary/thesaurus. Small enough to fit into your pocket, purse or briefcase, but large enough to include over 100,000 spelling words and 220,000 synonyms. It also includes 4.5 megabytes of information, proper names, major cities and states, jumble key for unscrambling words. (Great for those difficult spelling games.) Ideal for students, business executives, all who desire to improve and expand their use of the English language. Large 20 digit display with 9 operation indicators, auto shut-off. Weighs only 8 ounces. Uses 4 AAA batteries (included). 90 day warranty. **$119.98** ($5.00) #A1897.

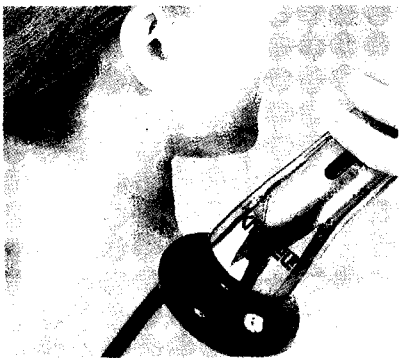
▼ SHARE THE BENEFITS OF YING-YANG HEALTH SPHERES



Ying Yang Health Spheres are traditionally given by the People's Republic of China to visiting heads of state. Now these Chinese treasures can be yours. Meticulously handcrafted, one sphere emits a high "female" pitch, the Ying; the other a low "male" pitch, the Yang. The Spheres are used by rotating them in the palm of the hand with the fingers. They have positive therapeutic benefits, exercising the delicate muscles and stimulating the nerves and acupuncture points. So, if you type, use a computer, play a musical instrument or engage in sports that rely on the powers of the fingers and wrist, Ying Yang Health Spheres can increase your agility and dexterity. #A1901 **$29.98** ($4.00)

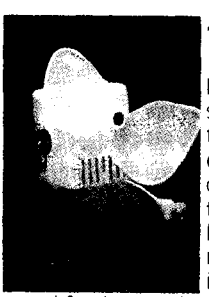
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

▼ INFRARED IMPROVEMENT



Home infrared heat treatments are an increasingly popular form of natural pain relief. Now the means of applying that heat have been significantly improved. Heating surface has been tripled, the larger contour head comfortably angled for reaching neck and back. Replaceable interior infrared bulb is now 10w, giving 45% more heat. Reaches deeper than heating pads or hot water bottles. The new infralux has two heat settings. High and Low (plus off) which allows you to experiment and choose most comfortable setting. It comes with its own zippered vinyl bag for neat storage or packing for travel. UL-listed. **$39.98** ($4.25) #A1906

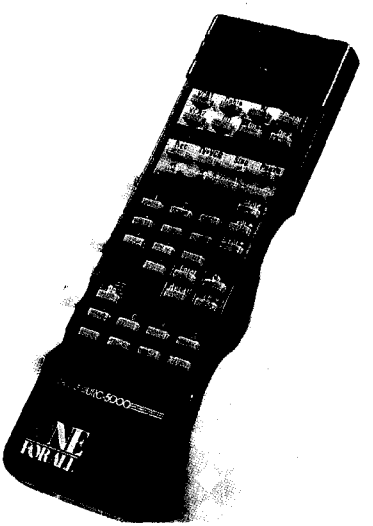
▼ MIGHTY LITTLE FAN



The most important qualities of a household fan are safety, quietness, portability and force enough to get the air circulating. We've found a little powerhouse of a fan that meets all these criteria admirably. This two-speed fan is completely safe — if the spin of the soft plastic blades is interrupted, the fan stops without so much as marking a finger. It moves an impressive volume of air. The blades measure 7" from tip to tip. We offer this fan in white for **$21.98** ($4.00) #A1604. Two for **$38.98** ($5.00) #A16042.

▼ A REMOTE FOR ALL REASONS

Looking for a way to simplify your handling of modern electronic gadgets? Then the One For All Remote Control is for you. Remarkably easy to use, it can replace up to 13 different remotes for your TV, cable, VCR, CD or other infrared appliances. When combined with its command center and X-10 modules (purchased separately) it can control lighting, infrared signal burglar alarms, and a host of small appliances. And, with its computer interface, it can be upgraded to work with the new, more advanced infrared-controlled security and energy management systems. So — simplify your life with the one remote that replaces all the rest. Includes 4 AAA batteries. 90 day limited warranty. 7½" H x 2⅜" W x ½" D **$129.98** ($6.00) #A1907.



TO ORDER: Send check with item number for total amounts, plus shipping & handling shown in ( ) payable to **MAIL ORDER MALL**, Dept. 050 AN, PO. Box 3006, Lakewood, N.J. 08701, or call TOLL FREE **1-800-365-8493**. NJ residents add 6% sales tax. We honor MasterCard/Visa. Sorry, no Canadian, foreign, COD orders. Satisfaction Guaranteed. 30 day money back guarantee for exchange or refund. Allow 30 days for delivery.

1989 Magalog Marketing Group Inc.
1909 Swarthmore Ave. Lakewood, N.J. 08701

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Ophiushis, Hydri and Pavonis. Most were just a string of numbers and letters. They formed a sphere in the hollow of which lay, closed off from the rest of the galaxy, Earth.

"The *Endeavor* will enable Earth to regain control of the Periphery?" I asked skeptically. "How nice of them to include representatives from the Centauri system, like me, and from Cygni, like you."

"The *Endeavor*, or its presence here, at any rate, makes the concept of the Periphery obsolete," Wagner replied. "As a battlestar, it was made useless by the Battle of Chiron. As an exploration vessel, it has leapfrogged thirty times further than the most distant Bestial outposts. It reasserts Terrestrial primacy in exploration.

"Which primacy will be graciously shared with Earth's allies. That is why you and I and various other members of this carefully chosen crew are from off-Earth. Some are even genetic variants. But none are Bestials."

Freschetti was waiting by my doorway. "I wanted to apologize for Elsa's behavior earlier. There was no excuse for the comments she made on the bridge."

"Since she made them, there is no need for you to apologize." She grimaced at this. "Excuse me," I added, uncomfortable with the feeling that I had done something wrong. "Perhaps apologizing for another is considered good manners on Earth or its Dependencies. As you may have noticed, social graces are not my strong point."

Surprisingly, she smiled slightly. "No. Nor is an ear for nuance. I just wanted you to know that most of us can express our envy of your accomplishments in more graceful ways than Elsa's. And despite what Wagner says, we were all chosen for this because we were all the best qualified. Don't let anyone tell you differently. If they pick on you, fight back."

I brushed the palm panel. The door slid aside. There wasn't, really, enough room to invite her in.

"Why should I give them that satisfaction?" I asked.

She bit her lip. "Because if they could know, for certain, that there really is a human being beneath that facade, shame might overpower curiosity and make them desist."

For an instant, she seemed about to say more. Then she shook her head, turned, and left me alone.

The sleeping pallet is uncomfortable. The foam within long ago fissioned into a combination of lumps and powder. Despite the tranquilizer, despite the instructions of the red-eyed nurse, I sit up in the darkness. My legs dangle, toes barely brushing the floor.

The thumb of my left hand rubs across the palm and back of my right hand. There is a pressure within me which has built to such a strength that it takes all my strength to resist it.

It is very important that I think of nothing at all.

Rumblings in the air vent resolve themselves into words.

". . . Never any chance." The thin, precise voice is that of the doctor, his Neoptoleman accent imperfectly overlaid with the impersonal correctness of the medical school. "Even if the proc-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tors had used stunners instead of lasers after he—after your sister died, the amount of syntho is his system was going to incinerate his central nervous system in no more than six hours in any event.''

''I do not blame you for failure to keep my weakling/berzerker brother-in-law alive.'' The deeper voice, gravelly with emotion, was my uncle. ''Later, I may have time to mourn my sister. Right now, I want to know about the boy.''

It seems as if the voices decompose into ventilator sounds. I begin to relax deeper into non-thought. My hands rub a comforting rhythm.

''He was not physically hurt,'' the doctor says at last. ''This time. He was within a meter of his father when the proctors opened fire. The sergeant says they saved his life. Maybe they did.''

''So if he's OK, why can't I see him? I have already sworn out the preliminary adoption warrant.''

More soothing silence. ''He is sedated right now. I'm sure you can understand how traumatic this has been. To see his mother murdered, to have his father's blood splattered all over him. . . . ''

It seems to glow in the darkness, despite the disinfectant soap, despite my rubbing.

''. . . in the past. There are burn marks, poorly masked by home healing gels. I know it sounds brutal, but in the long run, this may have been best for the boy.''

''Dr. Raghavan, I am a miner. I suppose that means that I am not very sophisticated. So if you mean that Alex has been put under because he was hysterical, you had better say so.''

My chest rises and falls unsteadily. Air rasping through throat and nostrils nearly drowns out all other sound.

''He has not been hysterical.'' The doctor's face floats before me in the darkness. ''You are suffocating within your shell. There is no way you can heal until the shell is broken.''

He thinks that I am repressing great rage and sorrow. Shame keeps me from admitting that there is nothing in me to repress.

''Cry!'' he screams, tears streaming down his face.

I open my mouth, but only a painful sighing issues forth.

''Cry!'' he screams again. I force my mouth wider, take a deep, convulsive breath. . . .

Shivering shook my cry apart. I was very, very cold. The doctor's face melted, collapsed, became Michelle Freschetti. She was looking down at me, speaking urgently. I shook my head to let her know that I could not hear her, that I was deaf with resuscitation shock. She took a breath, and said one word so carefully that I could see it on her lips.

Silicon.

2. *Silicon*

Carmine brilliance dominated the viewscreen. Data fed through the processors more quickly than the readouts could handle it. Paper spewed from the slots, hugging itself into tight scrolls for zero-gee neatness.

Potassium gas, titanium oxide, and graphite grains streaked across our hull.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

A new spectrum ran along the bottom of the screen.

"Dim the monitor," Zenner commanded. Light leached away until the incandescent ball resolved itself into two glowing disks touching each other like an exaggerated figure eight.

"That proves it! Betelgeuse is a *triple* star system. A white dwarf at 48 AU, and a contact binary, almost at the point of merging! Apehelion of almost 2 AU, perihelion right along the edge of the photosphere!"

It seemed overmuch excitement for a theory which went back to the days when every telescope peered at the Universe from the bottom of Old Earth's gravity well. Crawford's expression was neutral, edged with distaste. Even Wagner, wearing a T-shirt emblazoned with *BETELGEUSE IS THE PITS,* showed no inclination for the sarcasm which was his equivalent of polite conversation.

"Captain Kalfus had me resuscitated as soon as he saw the new lines," Crawford explained. "I have been watching it carefully as we have made even shorter jumps in-system."

Each of us, except Zenner, concentrated on the new spectrum. I spoke the function commands, expanding, brightening, over-exposing the image before me, trying to tease more information out of it. Lines of darkness, bars of unnaturally pure color. More complex than the earlier spectrum, and with reason.

It is an over-simplification to say that a star fuels itself with heavier elements as it exhausts the lighter ones. Rather, once a lighter element decreases below a critical threshold, the heavier element ignites, but all the previous ones keep burning. Layer piles on layer, each burning with its own heat, each sending its own light through convection spicules nearly the size of Sol or Centauri A, each adding to a more complex spectrum.

"How long have the silicon lines been present?" I asked.

"We picked them up eleven light-months out," Crawford said evenly.

Kalfus had been standing to the side, repressing with difficulty an impatience which in the weightlessness would have tossed his velcro-moored body about like a submarine plant whipped by surface storm waves. Now he addressed me.

"Dr. Raymond. Five light-years back, you stated that Betelgeuse would fuse silicon for a year. That means that we should have a good month left."

Crawford did not turn, but the brittleness of his tone told me that he had been over this ground before. "It isn't that simple."

"I said that it should take no more than a year," I said carefully. "But it *isn't* that simple."

"Tell him why it isn't so simple," Zenner insisted. "Tell him, Iceman. Tell him that it is because of the secondary star which I predicted, which I have discovered, and which all of you are trying so diligently to ignore."

Wagner made a disgusted sound. "If you wish," I said. "But I think that Dr. Crawford could explain more fully."

Crawford rubbed his hands wearily over his eyes, and stared moodily at the main display. The two stars twisted about each other in a fiery coupling.

"There are two tendencies which work against each other." He was

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

choosing his words carefully, trying to be exact without losing Kalfus in technical jargon.

"You might think that the more hydrogen a star has to burn, the longer it can burn hydrogen." Kalfus very intelligently said nothing. "Actually, the very opposite is true. There are red dwarf stars burning today which have been in existence for most of the lifetime of the galaxy. Stars like Betelgeuse blaze their way across the heavens in a cosmic eyeblink. Dr. Raymond outlined to you the basic profile of a giant star on its way to becoming a supernova. The actual time it takes a given star to go through any stage is directly related to its composition at formation, about which we have only approximate ideas in the case of Betelgeuse, and its precise mass.

"Dr. Zenner is correct in stating that this latter uncertainty is presently the most serious one. We have two stars and we do not know the actual mass of either one."

"Take the aggregate and work the figures from that," Kalfus said impatiently.

Crawford shook his head. "It doesn't work that way. We must know the mass of the larger star to determine how quickly its core will burn its way to destruction.

"In any event, the secondary star is being stripped of its outer layers as it spirals into the primary. Most or all of that is presumably hydrogen. It may appreciably delay the primary's evolution into a supernova. Or it may not."

He cocked an eye at Kalfus. "That's the reason we do fieldwork. To learn things we don't already know."

"Then you had better get on with it quickly," Kalfus replied, "before we are forced to cut short your measurements!"

The seat harness held me snugly enough against the pilot's chair that I could almost forget I was weightless. I completed the system checks.

"Request permission to cast off."

"*Bounty*, you have permission to cast off." Kalfus' voice was brisk. I caught the implied reproof at not identifying myself by the name of my craft. But then comet hunters were never much on Space Force military procedures.

"Watch yourself, Iceman. It's hot enough out there to melt even you." Concern, mockery . . . I couldn't judge Wagner's motives. I wondered if he could.

"You don't have to launch all the probes on this mission." I felt uneasy at the unguarded concern in Michelle's tones. "The rest of us can take turns piloting the *Bounty*."

"Noted. However, I am the natural candidate for this part of our research."

The hull of the *Endeavor* slid aside, disclosing stars. I engaged the thrusters at minimum power, nudging the *Bounty* into the emptiness.

The exterior was ghostly in starlight. Built originally to reflect battle lasers and any other sort of radiation which might be hurled at or exploded near it, it was mirror-smooth and perfectly reflective.

The *Bounty* drifted further away. I was giving the commands, both manuals and automatics, in a gingerly fashion. Four racks of probes had been welded onto the hull. They jutted out

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

at right angles from the *Bounty*'s tapered cylinder, making it look like a runaway windmill. I was trying to get a feel for what they did to the inertia and center of gravity of the spacecraft. Sure, it had all been programmed in before I lowered myself through the airlock. But my uncle had told me too many stories of sky miners who had relied on published specs or someone else's programming of the pilot comp for me to trust even Space Force work.

Crimson light blazed along the rim of the *Endeavor*, turning it into a bloody sickle cleaving the darkness. Betelgeuse came into view.

It was swathed in a red haze. The outer layers were boiling away in a weight loss program begun several million years too late. Convection spicules mottled the surface, contorting into something like a spiral pattern near the southern pole. They were the only sign that a star nearly as large as Sol churned below the surface.

I had no idea I was whistling until I heard Wagner over the communicator. "Lord, Iceman, I know you have no nerves, but that banshee wailing would unnerve the dead."

I stopped, confused and self-conscious. Michelle saved me the necessity of a reply.

"It is not banshee wailing. It's Berlioz. From his *Requiem*. I thought Terrestrials appreciated cultured tastes."

So it was, I realized in surprise. Grimness laid on with a broadsword, the orchestra massed in compelling, almost strident gloom:

Ah, that day of tears and mourning,
from the dust of earth returning,
man for judgment must prepare him.

Extravagant thoughts to be inspired by a ball, even a large ball, of incandescent gas. I stopped the whistling, even though Wagner said no more.

I was running through the quantum drive checklist when two clear, high-pitched tones sounded in the cabin. I looked over at a display plate the size of my palm. Two luminescent blue dots rippled across the screen, like a pool disturbed by raindrops.

"Dr. Raymond, say again your reading on the auto-degaussing assembly." It was Lieutenant Horner. "I did not catch your last group of settings."

Because my voice had died before I could relay them. I wet my lips and forced my vocal chords back into operation.

"I . . . I want to report a double neutrino event, just observed. Please check your main detector bank for signs of unusual activity."

Silence, save for distant clicks of static. I watched the now-blank panel anxiously while I waited.

"Raymond, this is Crawford. We have been averaging one event per hour. We have noted no increase. Has your instrumentation noted further events?"

I shook my head. "No."

"Then I think the doubling was just coincidence. We see no iron yet. Keep us informed of any further activity."

I let myself breathe. "Will comply."

A hundred thousand neutrinos flood through your body every second of your life. Probably not one of them will ever interact with one of your atoms. To them you are less substantial than a ghost.

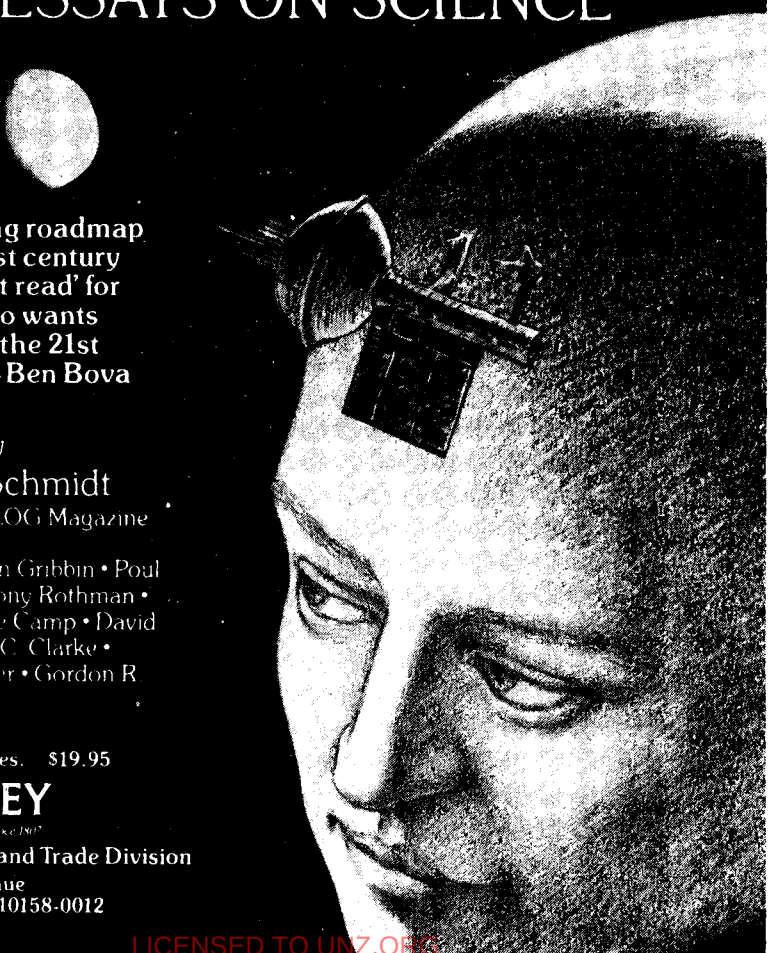
But soon, very soon, Betelgeuse would release a burst of neutrinos such

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

From the preeminent science-fiction monthly on planet Earth—an important collection of its best science-fact offerings of the past decade...

analog

ESSAYS ON SCIENCE



"An exciting roadmap into the 21st century and a 'must read' for anyone who wants to live into the 21st century."—Ben Bova

Edited by
Stanley Schmidt
Editor, ANALOG Magazine

Including John Gribbin • Poul Anderson • Tony Rothman • L. Sprague de Camp • David Brin • Arthur C. Clarke • K. Eric Drexler • Gordon R. Woodcock •

At all bookstores. $19.95

WILEY
Publishers Since 1807

Professional and Trade Division
605 Third Avenue
New York, NY 10158-0012

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

that even our detectors, which catch only one in 100 million, would be overloaded displaying events.

I hoped to observe all of this from a great distance.

I had not been boasting when I told Michelle that I was the natural choice of the astronomical contingent to pilot the *Bounty*. For ten years starting at the age of seven, I had lived on, worked on, co-piloted and piloted small spacecraft. They had belonged to my uncle, William Grant.

After adopting me, he had faced a dilemma. His job as a comet hunter kept him in deep space for months at a time. The company ran schools for employee children, but my uncle agreed with Dr. Raghavan that it would be inadvisable to board me in any of these. The better ones, where I might have received the care they thought necessary, were simply too expensive.

So he took me aboard his spacecraft, the *Whipplesnapper*. The law would allow me to stay there as long as I could pass the biannual competency tests. I could imagine no threat so effective as that of being put in unprotected with those said to be my peers.

Uncle William felt guilty about this. He apologized repeatedly about keeping me isolated from children my own age. At first, he did not believe it when I said that I was perfectly happy and he had nothing to apologize about. When he realized that I meant what I said, he seemed irritated rather than relieved. I realized again that I had no understanding of other human beings, even one as rational and good-hearted as my uncle.

People say silly things when they learn that you have been a comet hunter. "How can you stand the silence of deep space?" ask those whose ideas of space travel come from old reading disks quoting Pascal.

First of all, even if space were quiet, human beings, even the hardiest, cannot experience it because they must live in spacecraft. Spacecraft are never completely silent unless they are dead. There is always a steady susurration from the air vents, and beneath that, an almost subsonic throb of the drive engines. Overlaying these constant sounds, there may be the sounds of a computer working a program you have fed into it, a microwave cooking your lunch, or music.

(Uncle William loved music, all types. Twanging ballads that spacemen like himself might sing in some orbiting bar, or some new piece of neoBaroque seeking to expand the legacy of Bach, Brubeck, and Bolling. He would trade music with like-minded comet-hunters crewing ships like *The Oortman, El Dorado, Lucky Strike, Deep Hunter,* and *Burning Woman*. Even their names were musical.)

Mastering my studies was never a problem. For one thing, I had far fewer distractions than other adolescents. Facts were solid and discrete, easily memorized and then manipulated. I found in disciplines like mathematics and physics a strength and purity which would become increasingly attractive as I got older. They were difficult enough to engage the mind, but never capricious. Never wantonly destructive.

Uncle William encouraged these tendencies for severely practical reasons. Physics and mathematics are the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

lifeblood of a comet hunter. There is the multi-dimensional physics of the quantum drive which hurls you out into the darkness between the stars. Classical physics controls the tenuous orbits of the loosely-packed snowballs you hunt. And mathematics gives you the tools to sort out the search patterns most likely to lead you to those ices more precious than gold to the parched world of Chiron.

It also taught lessons in humility. Uncle William specially edited for me a series of lessons on gravitational resonances. I learned all the elegant theories that had been shattered by the first *Voyager* photographs of the rings of Saturn, the further astonishment at the discovery of rings around Jupiter, Uranus, and Neptune. He had me perform the calculations which proved that neither Alpha Centauri A nor B could possibly have planets. Then the similar calculations which likewise proved that neither Alpha nor Proxima could have Oort clouds of comets. Both times he challenged me to discover the hidden assumptions responsible for these erroneous conclusions.

(I began to learn then, though I would not know that I had learned it until much later, that facts and their combinations are infinite: that wisdom is not precisely the accumulation of knowledge, but rather the ability to rank facts in their proper hierarchy, and to know which 99 percent can and should be ignored.)

At the time, all I saw was the pragmatic motivation for this exercise. Comet hunters make or lose their fortunes by finding the greatest number of comets for the least expenditure of resources. Go by the book, and you search only those areas where nearly everything has been claimed already. Go by your hunches, and you are likely to go broke finding nothing. To succeed, you have to know more than the book, to know why triple star systems can have both planets and Oort clouds.

"Why do you like this life?" Uncle William asked once. I had just been arguing with his plan of placing me in one of the better in-system schools if this trip proved lucrative enough.

I could not admit fear even to myself. "I like the independence," I said. "You go where you want to go, when you want to go."

He favored me with the look he used when he found stupid mistakes on my tests. "And if I don't want to go, I am perfectly free to starve."

"Everyone has to work," I countered. "You can set your own terms. You determine the most rational way of meeting your goals."

Uncle William gave a short, pained, laugh. "My goals are set by over a billion thirsty people. I suppose I do choose the best way to meet those goals. But you think I do this all by myself?"

"You just showed me how you generated our search matrices," I said hotly. "And I don't see anyone else out here with us."

"Not out here," Uncle William agreed. "But what about on the way back in-system? Who looks out for the snowballs I have sent tumbling down the gravity well and makes sure that jumpers don't switch my claim markers?"

"The recovery teams," I said grudgingly, "but only because it's in their

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

own self-interest to support a good producer like you."

"Well, yes," he agreed. "But has it ever occurred to you that altruism and intelligent self-interest may be synonymous terms?"

The One is the Many. Only the weak are truly mighty. Only the mighty are completely powerless. Every fake wise and/or holy man who has ever lived has known that one sure way to impress the ignorant is to take defined opposites and pronounce them identities. Once you get the hang of it you can do it all day, and it sounds *so* profound.

I had not expected that my uncle would ever resort to so shallow a rhetorical trick. It is the only time I can remember that I was deeply disappointed in him.

The *Bounty* skipped in and out of Space$_2$, dropping probes at preset distances from Betelgeuse, and at preset lattitudes, all ready to transmit their data on the stages leading to the explosion of the star. Which they would do until the star reached out and liberated them from all material bonds.

At times, I was so close that Betelgeuse seemed a flat, bloody plain beneath me, stretching out to infinity in all directions. Dark magnetic storms larger than the Earth swirled across the unbearable brightness of the star's surface. Prominences shot out of them at velocities greater than 1,000 kilometers a second, forming flaming bridges brighter and more terrible than any dreamed of by the Asa.

The technology that fashioned the *Bounty*, like that of the *Endeavor*, had come from war. Both craft had been designed to withstand everything from nearby atomic detonations to direct bursts from combat lasers. But even the most highly reflective surfaces, the best thermal transfer and refrigeration systems, could withstand the close-up fury of Betelgeuse for no more than seconds at a time. Only by hopping through spacetime like a water droplet on a skillet could I collect data and escape incineration.

Watch yourself, Wagner had warned. *It's hot enough to melt even you.* It had been only a wisecrack. Yet, when I was on the edge of sleep, it seemed to me that I was in the furnace of an alchemist, being melted, purified, refined. . . .

Understandable enough, I would think, when full consciousness dispersed these vapors. You are further away from humanity than any other man has ever been. Your body has been frozen for years at near absolute zero. Now you are as close as you can possibly go to one of the most potently awesome forces in the galaxy. Of course your subconscious is going to react to such symbolic stimulation.

Only this, and nothing more.

There were bulges, ripples, swirls in the surface of Betelgeuse which could not be explained by its engulfed companion. Crawford and Michelle adapted an old program that had been used by the first explorers of the Centauri system. Numbers converged at points on a three-dimensional grid. I was given new sets of coordinates to explore.

Thus was discovered the first planetary system of Betelgeuse. Its members had scarcely had time to accrete, much less to cool. Now they were heating

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

again, prior to their death throes. The closest were spheres of liquid iron. Further out, I found planets where islands of black rock were washed by waves of glowing lava.

"Iceman. I have a new set of coordinates for you." Zenner's voice was only slightly fuzzy in my earphones. As a piggy-back experiment, the *Bounty* was carrying an experimental Space$_2$ radio. Directing pure energy through higher quantum levels was much more difficult than sending spacecraft through. Electromagnetic pulses became chaotic when boosted into higher spacetime, dissipated, and cascaded down almost immediately into normal space. Like so much, the radio had been developed for the war, which had ended before it could be fielded.

Coordinates rippled across the display above my primary keyboard. All of them were for points far above or below the plane of the planetary system I was charting.

"And yes, before you ask it, I am sure about those positions! My calculations show that there is an entire secondary planetary system in this vicinity."

Wagner's voice sounded in the background. The words were unintelligible, but sounded derisive.

"In fact, several of them should be gas giants. If you turn your sensors towards that fourth set of coordinates, you should be able to pick up the radio noise it generates."

Since she had not given me specific wavelengths, I tapped in a wide spectrum search. Give her her due, I was immediately rewarded with a roar of howls, whistles, clicks and electronic burps which signaled the presence of a hot super-Jovian.

And something else, very different. High-pitched and so rapid that the pauses in between repetitions of the messsage could be discerned only as a syncopation of the beat.

Words splashed themselves across the display.

—SOS SOS STARSHIP CHARON SOS SOS . . .

"*Endeavor*, this is *Bounty*. Do we have any other lifeships out? I am receiving a distress call."

I patched the call through on the Space$_2$ communicator.

"*Bounty*." Horner's voice. "None of our ships are away except for you."

Silence. The message kept repeating, scrolling itself up into oblivion. I tried to imagine what was occurring on the bridge of the *Endeavor*. If Kalfus had really been trying to make his career on being the first explorer to penetrate this far into the galaxy, as Wagner had said, he must be feeling quite surprised. The thought was unexpectedly pleasant.

Almost absently, I began laying in a course to Zenner's super-Jovian. At the first execute command, the *Bounty* came about and began accelerating at 1.5 gees. It would take a few minutes to change momentum and set the proper vector.

"*Endeavor*, this is *Bounty*. I am about to make a jump to the estimated origination point of the distress call and see if I can be of assistance."

"*Bounty*, keep relaying. We want to triangulate." Horner's voice overlapped my last words. Even with a carrier beam traveling at four times the speed of light

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

it would be another minute before they received my last transmission.

Stupid idea, though. As pushy and, well, flaky as Zenner could be, did they think it was just conincidence that the distress call was coming from precisely the same direction as one of her theoretical planets?

On the navigational display, the arrow representing the *Bounty*'s actual vector rotated the last few degrees until it coincided with the programmed vector. The two arrows merged and blinked green.

The quantum drive simultaneously signaled its readiness. I gave another execute command, starting the countdown.

"*Bounty*, this is *Endeavor*. Captain Kalfus speaking." The voice was angry and, I thought, just a bit frightened. "Do not, repeat, *do not* attempt a jump in the direction of the distress call. Its coding format is non-standard—"

How like the military to consider something like that a mortal sin.

"—and possibly counterfeit. Our data base gives Bestial codes from the war as the closest match. Return immediately to the *Endeavor*—"

. . . 00:07, 00:06, 00:05 . . .

My hand hovered over the abort key. Bestials. Uncle William's face, flushed with fever, flecked with blood at the corners of the mouth. What would I say to them? Could they, clawed and fanged, be more terrible than a dull vacancy empty even of a desire of revenge?

I watched, frozen, as the seconds disappeared and the drive kicked me up the quantum ladder and out of the universe.

I had never seen a Bestial. Before the war, most of them had been kept on the Periphery, where their special abilities could be put to the most remunerative use by their owners. After the war began, those in Allied space were interned and there was no further opportunity to view, up close, our new enemies.

The lack did not bother me. I was the sole inhabitant of an observation station run by the Centauran Astronomical Union. It orbited forty AU's above the plane of the Centauri system, sifting signals from distances impossibly distant even for quantum drives.

There had been brilliance enough in my dissertation to merit this post, despite my youth, but that was not why I had been given it. Nor was it the familiarity with deep space instrumentation and life support I had learned from Uncle William, though that had undoubtedly been important. No, it had been both of those, plus an ability to live alone for long months at a time between supply ships, with only the sound of the air recycling system and the clicking of the computers.

I relished the isolation, the peace. In the silence, there were few distractions from the data my instruments recorded. It would form patterns in my mind, even as I slept. I published. Without intending it, I built a reputation.

News of the war came in the geninfo packet which was beamed to me on a weekly basis with the Union's latest data requests. I paid it little attention. It was merely mindless violence of a kind I had once been all too familiar with, wreaked in macrocosm. How much more sane to float high above it, listening to the stars.

I must have been more realistic than

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

FULL COLOR GRAPHIC NOVELS

THE NEW DIMENSION

BELL'S THEOREM
Trilogy of Schultheiss
$10.95 ea.
37 62 74
Medical experiment turns nightmare in parallel world.

ABOMINATIONS
by Hermann
$9.95
Short horror stories. 80

FIRES
by Mattotti $12.95
Mystical possession ends in expressionist inferno. 48

MAGICIAN'S WIFE
by Charyn/Boucq $14.95
45 Werewolf wife is victim of magic.

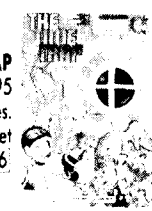
FALL OF THE HOUSE OF USHER
and other Poe tales by Corben
$10.95
13

GODS IN CHAOS and **WOMAN TRAP**
by Bilal $12.95 ea. 49 50
Paris, 2020, Egyptian dieties struggle for power.

MAGIC CRYSTAL
by Moebius/Bati
$6.95
S&S quest for young adults. 67

VULCAN'S FORGE and **THREE SUNS OF VINA** by Leloup
$6.95 ea. 65 76
Teenage heroine in detailed technological sci-fi adventure.

TIME TRAP
by Jacobs $8.95
For all ages.
Will he get out alive? 66



MAIL ORDER TO: ANALOG MAGAZINE
Dept. 590, 380 Lexington Ave., New York, NY 10017

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

You do not need to use this coupon if you need more space

Please send me the graphic novels circled below:

13 37 45 48 49 50 62
65 66 67 74 76 80

Please add $2 postage/handling per book; NY orders add 8.25% sales tax. Please send check/m.o. only. Do not send cash. Allow 6-8 weeks.

TOTAL ENCLOSED: $ _____

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

that, for I remember no feeling of surprise when the recall order came. The Sky Marshall had seized all observatories of the Astronomical Union. All observation programs were scrapped. The sensors would conduct fully automatic searches for the Čerenkov wakes of incoming Bestial cruisers.

Up until then, the stations had been unmolested by the Bestials, who had concentrated their attacks on military targets like orbital docking and assembly facilities. With its new mission, my observatory was now a military target. My presence was neither desired nor necessary.

The shuttle that picked me up was half way to Chiron when the attack came. We knew nothing about it until we dropped into normal space, high over the planet. Warning lights blazed all over the pilot's console. A wide-eyed face appeared on the tele-screen, makeup smeared by sweat.

"This is Traffic Control. Chiron is under attack by a Bestial fleet of undetermined strength. No in-coming flight plans can be accepted for the duration of the emergency. All vessels should leave the vicinity of Chiron until the cessation of hostilities. If you are spotted near the battle zone you may be fired upon by *either side*. This is a recording.

"This is Traffic Control . . . "

The pilot jumped us two light-minutes above the ecliptic. We floated, trying to make sense of the battle from bursts of coded radio traffic. Occasional, far-away flashes of blue-white would sear the eyes if you were looking directly at them. Mostly there was silence and the unchanging backdrop of the stars. I drowsed and woke and drowsed again.

Then, seven hours later, it was over. Ships like ours came hesitantly out of the darkness and queued up on the boards of Traffic Control. It took them nearly another seven hours to unscramble the confusion and get us on the ground.

Uncle William was living planetside in semi-retirement, adding to savings by serving as a consultant to comet hunters who did not work for the great corporations like Flying Mountains. Only when I keyed into the Locater net did I learn that he had been in one of the desert settlements outside Peirpont which had been bombed by the Bestials.

I found him in an emegency ward pitched on the desolate plain. Heat shimmer distorted the billowing smoke which enshrouded the horizon. The ward was a long series of tents. Their white, pre-stressed fabric flapped and strained against the strong gusting wind.

Inside, rows of cots stretched into the dimness, interrupted only where the cots had apparently run out and the victims lay on blankets or sleeping bags or, in a few cases, in what remained of their clothes on the bare ground. Most lay quietly, either asleep or with eyes staring upward. As I walked between the rows, moans added their intermittent chorus to the wind. Not loud, or in obviously great pain. Low, introspective perhaps, the sounds made by a sleeper restless with nightmares.

Where clusters of tents joined, a folding table had been set up and made into a nurse's station. It seemed impossible that they would know if my uncle were here, much less let me see him. I was

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

wrong on both counts. A Franciscan led me down another twisting arm of connecting tents. The body on the cot where we stopped was shapeless under a sheet. William's face was turned away from me. His eyes were closed.

"We are so glad you are here," the Franciscan said. "We don't have anything near enough people to care for all these patients. This is your uncle's meds indicator." He fingered a rectangular piece of plastic attached to William's wrist. "When it changes from green to red, it means the time-released antirad patch needs to be changed. Grab one of us if you see that.

"Also, if you would, please check the patients to either side from time to time. It would be a great help."

Since there was no chair, I arranged myself on the floor as comfortably as I could. William turned, but continued sleeping. People came and went. A roar and a countergust of wind twice signaled the landing of medevac flitters to take patients to the overcrowded hospitals in Pierpont. Bodies were removed as well, by silently shuffling orderlies.

I could hear low-voiced conversation from the nurse's station. The rumor was that we had won the battle. The Bestials had bombed the desert in an attempt to force the Centauran Sky Marshal to concentrate near the planet. The Sky Marshall had refused this ploy and allowed them to blast the planet at will. For this, he was said to be a genius and a hero.

After nearly two hours, I noticed that the meds indicator of the woman to the side of Willaim had gone red. Neither doctors nor clergy were in the makeshift corridor. The nurse's station was deserted when I went back to it. A doctor with bloodshot eyes showed up finally and thanked me for my report. They were temporarily out of supplies, but would change the patch as soon as possible. He tapped a note into a portacomp on the table.

I went back to my place at William's side. After a while, I must have fallen asleep. I opened my eyes to darkness. Light-sticks hung from tent supports, casting wan light. It glinted off William's eyes.

"I couldn't believe you'd come," he said. His voice was like dry paper. "I thought I must be dreaming."

I told him to be quiet. His brow burned beneath my palm. His meds indicator was dark, but in that light I could not tell if it were red or green.

"I am so pleased . . . to see you well," he continued. Each breath sounded painful, a rasping across raw, bleeding tissue. "I feared you would be another victim of this madness. But you were . . . much smarter than I have been. You stayed above it all. Let all the other fools kill themselves off. I should have learned from your example."

I shook my head, more frightened by this than by the fever or the trembling which threatened to shake his breath apart.

"No use trying to help people. Love pain and destruction and stupidity too much to change. 'S in the blood."

I shook my head slowly. If that were true, what hope did I have?

That is false, I wanted to say. *I am alive today because you know that is a lie. We are not solitary atoms. We are . . . points in a network, acting, reacting, growing . . .*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Reticence proved too strong. By the time my lips formed around the first tentative word, he had become completely still. A thin line ran from the corner of his mouth and soaked darkly into the sheets.

If I had meant everything I had thought, if it had really been more a part of me than just some intellectual revelation, I would have stayed at the field hospital as long as I was needed to help the doctors, to help the dying, perhaps to help some to live.

I don't remember everything I did. All I remember is talking to a worker at the nurse's station, giving my credit number to pay for the funeral, and leaving.

The only family (except for a madman who tried to kill me, except for a woman both too forgiving and too horrified to protect either herself or me) I had ever had. My only good link to the rest of this brilliant, violent, unfathomable species.

They had killed him, and thousands of others, for no reason I could understand. I wondered what we would say to each other.

3. Iron

The planet was boiling. At the push of two buttons, a temperature profile displayed itself. In the depths, heat approaching that of a T Tauri star, which in a sense, is what it was underneath the sheath of methane, ammonia, and hydrogen which gave it the appearance of a super-Jovian.

The temperature dropped with distance from the remnants of the protostar, then suddenly rose again, sharply. Storms swirled violently, trying vainly to disperse the excess energy burning down upon them. Continent-wide thunderheads rose from the cloud deck and scraped the edges of the atmosphere. Lightning discharged in bolts powerful enough to sustain the *Endeavor* for a year. The edges of the planet blurred as gaseous wisps expanded upwards with more than escape velocity.

The signal came from a satellite about two planetary diameters beyond the rim. But not directly from the satellite. From a metallic ovoid swinging in orbit around it.

I made a mini-jump and came out ten kilometers above it. A large craft, just barely smaller than the *Endeavor*. I started talking quickly, to keep anyone inside from getting nervous at my sudden appearance.

"*Charon*, this is *Bounty* from the survey ship *Endeavor* responding to your SOS. How may we assist you?"

The distress call droned on without a pause. I tried again, with the same lack of response. It occurred to me that Kalfus might have had a point about being cautious. I aimed my sending antenna at where the *Endeavor* ought to be and started transmitting. It would be a few minutes before Kalfus could reach me with a blistering order to get back where I belonged. But if, in the meantime, I were vaporized by a battle laser. I owed it to the rest of the crew to make them aware of that.

I set my own message on automatic repeat and increased the magnification on the viewscreen. "The vessel is of a class unknown to me," I admitted. "The various protruberances and extrusions make it clear that it was never

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

RETURN TO THE MOON

This time to stay.

President Bush has initiated a program to establish a permanent presence on the Moon followed by the exploration of Mars. This program will result in the permanent settlement of Space, but **only** if it is approved by Congress.

Spacecause, the pro-space, grassroot lobby organization, is encouraging all possible support—but the opposition to the program is strong in the midst of the budget crisis is facing the words of Isaac Asimov. *"If you want to see anything new, anything... Space. **NOW** is the time to act."*

Please write to Senator Barbara Mikulski and Congressman Bob Traxler. Ask them to support full funding for the President's Moon Mars Program.

The addresses are

Senator Barbara Mikulski	Congressman Bob Traxler
330 Hart Senate Office Building	2364 Rayburn Building
Washington, DC 20510	Washington, DC 20515
(202) 224-4654	(202) 225-2806

Then get your friends to write or call and get each of them to do the same.

Spacecause's Boards of Governors and Advisors include Isaac Asimov, Greg Benford, David Brin, Ben Bova, Arthur C. Clarke, Gene Roddenberry, Stanley Schmidt, former NASA Administrators James Fletcher and Dr. Thomas Beggs.

Join the growing list of Spacecause contributors. For as little as $15 a year, we will keep you informed on a timely basis of what is happening in Washington and how you can help promote the Space Program with letters and phone calls.

Yes! I want to help promote our future in Space and have enclosed:

☐ $1000 ☐ $100 ☐ $50

☐ $25 ☐ $_____

Name: _____

Address: _____

_____

Send to: **Spacecause**
3435 Ocean Park Blvd.
Suite 201-G, Dept. AN1
Santa Monica, CA 90405

Contributions in gifts to Spacecause are not tax deductible.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

designed to operate within an atmosphere. Orbit to orbit only. However, I would guess that it is not now and never has been a warcraft. The exterior resembles a patchwork, but every one of its components is too non-reflective. It would soak up all laser and blast radiation and cook whatever might be inside."

The surface was . . . odd. I raised the magnification. The apparent smoothness of the surface disappeared, giving way to warped undulation. Micro-shadings mottled the basic colors, like the remnants of dried puddles. Here and there, clusters of small holes. Not craters. More like bubbles in foam.

"I think Fu should study these pictures closely," I said. "I am no expert, but those skin panels look like a classic case of materials buckling under quantum stress. If so, this ship was lucky to drop back into normal space before vaporizing."

Sound erupted in my earphones. For a few seconds, I actually thought it was static. Then, in the deep, almost subsonic *gurgling* glottal stops and coughs, I made out words.

"*Bounty,* this is Charon Station. Are you receiving us?"

"Roger, Charon Station. There seems to be static on the waveband. I am just barely making you out. How may we assist you?"

A pause. ". . . are very sick. We need medical aid."

I waited. There was no more. "Charon Station, please confirm your location. I am in orbit above your spacecraft, but I am having difficulty tracing your signal."

" . . . *Charon* has been abandoned. All survivors are downside. We'll give you a nav beacon."

A high, pure tone speared up from the clouds below. For the first time, I gave the satellite serious attention. Its overall temperature, and that of the super Jovian, for that matter, disclosed that it had to be older than the other planets I had surveyed. Older than Betelgeuse itself. Almost certainly a member of the system of the secondary, submerged star.

Larger than Ganymede, probably originally a conglomeration of rock and ice. As Betelgeuse grew hotter, the ice melted, then evaporated. Water vapor, at temperatures up to 200°C, made up a substantial portion of the bottom layer of the atmosphere. Somewhere around ten kilometers up, ultraviolet broke the water molecules into oxygen, which formed its own layer, and hydrogen, which went streaming off into space.

Given time, the oxygen would combine with the carbon in the rocks and this world would become a carbon dioxide greenhouse, a miniature Venus. It would never have that time.

"Ah, Charon Station, my instruments indicate high windshear at several levels. My craft was not designed for atmospheric flight. Could you send someone up to me?"

"Negative, *Bounty*. None of our remaining craft are operational. You will have to come down to us."

I gnawed my lower lip, considering that. It wasn't just my inexperience as an air pilot. It now looked like Kalfus had been right. Charon Station was manned by Bestials, who should not have been within six hundred light-years

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of here. Despite the peace treaty, I felt reluctant to trust myself to them alone.

On the other hand, it was only a few minutes until a message from the *Endeavor* caught up with me and Kalfus took the decision out of my hands. Once again I would remain high above the messiness of suffering and death. Just like I always had been.

I spoke the command. The *Bounty* fell from orbit, homing in on the nav beacon.

I'm told that in the old days, pilots flew their craft with analog controls, directing their course by changing the air surfaces, increasing or decreasing thrust or angle of attack. It sounds romantic and scary as hell. Nowadays, of course, you program into the control board the result you want and the flight computer, steadier and with quicker reactions than possible for any human, flies the ship in the desired manner.

Trouble came sooner than expected. Three kilometers above the highest cloud layer, the *Bounty* shuddered as it hit the local equivalent of a jet stream. The engines could compensate without difficulty. The problem was the probe racks. They vibrated like insane tuning forks. It wouldn't be that much of a loss if they were torn off, since I had launched all the probes. What bothered me was not being sure how much of the hull they would take with them.

I spoke a new command sequence. Obediently, the *Bounty* pivoted on its own center of gravity, turning a minimal profile to the wind. The vibration decreased, but did not entirely cease.

Clouds swirled up and blanked out the visual scan. I concentrated on the ground radar. It showed, in increasing detail, a jumbled, fractured landscape. The homing signal seemed to originate from the base of a long, high cliff. The image of that area was fuzzy. It fluctuated arhythmically, giving tantalizing glimpses before blurring back into indistinctness.

I discovered why when the meteoroid alarms began flashing and shrieking. Small rocks and sand scoured the hull. It was blowing off the top of the escarpment at 150 kilometers an hour. The *Bounty* fell beneath it before I could figure out an abort sequence which would lift me back into orbit.

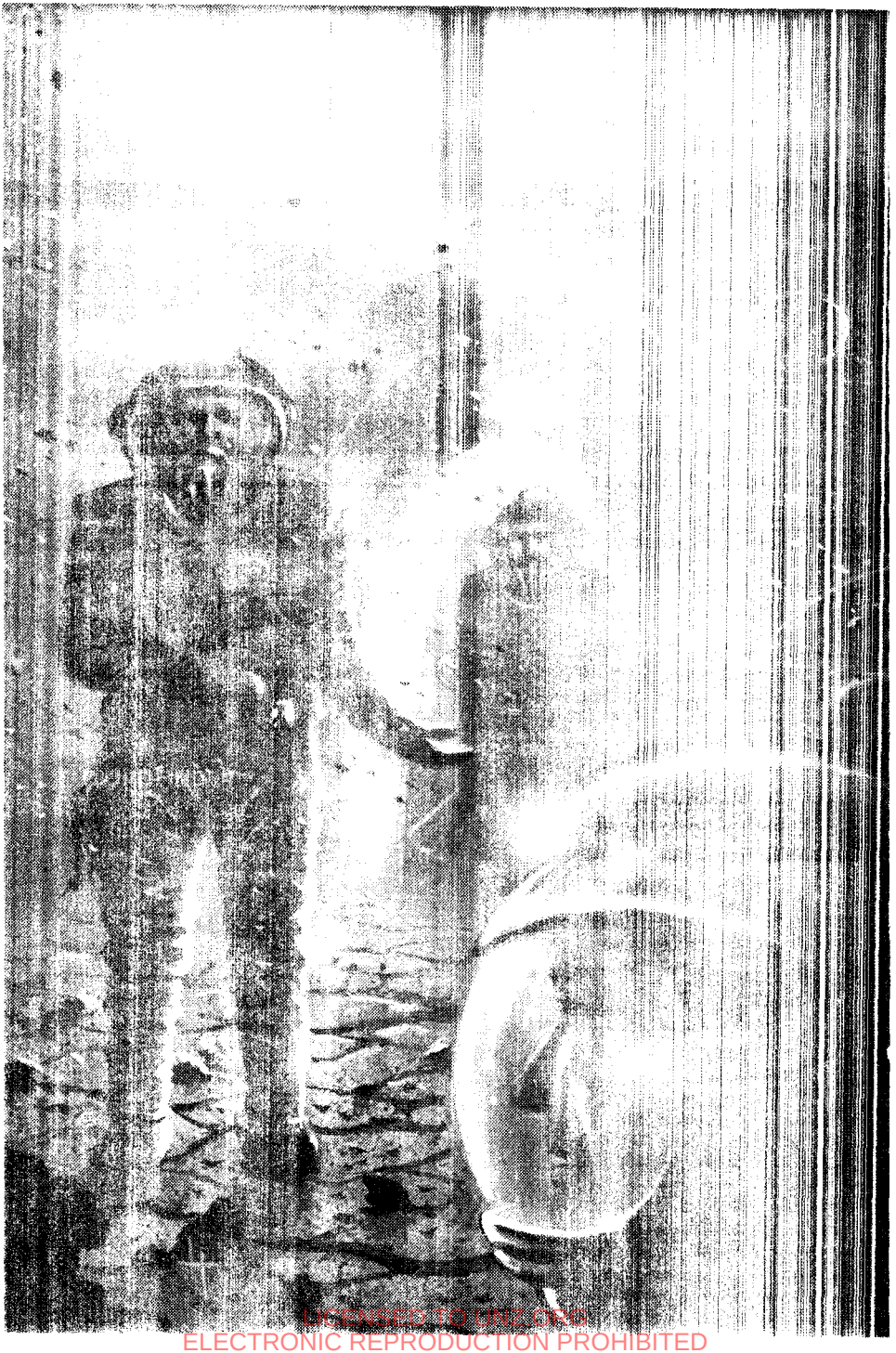
Landing, even in the relative calm was a problem. The *Bounty* had no landing struts to hold it upright, nor could it rest horizontally without tearing out the probe racks. I brought it down on its tail, and programmed it to hold itself rigidly vertical against any gusts which might sweep down the cliff side.

I stepped out into blood-tinged dimness. Steam swirled erratically across baked gravel. Betelgeuse was a crimson smear across the sky.

Dark figures grabbed me. I resisted for an instant. Then I realized that they were guides. Steam obscured everything more than a meter away. The cliff itself could be discerned only as a wall of relatively greater darkness.

The gravel crunched beneath our feet as we walked. The insulation of a vac suit has to be nearly perfect to prevent you from freezing to death in the cold of interstellar space, and that same insulation works to keep heat out as well. Still, there was more than noticeable warmth seeping in around heels and soles. My air seemed to be getting uncomfortably warm.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I was relieved when an airlock appeared in front of us. I stepped inside and pulled off my helmet as soon as the inner hatch opened.

The stench was like a physical shock. I had smelled something faintly like it in the hospital tents on Chiron: the acrid scent of sweat, the sharp pungence of gastric juices, and over everything the sickly-sweet odor of decaying flesh. There, however, the dead were collected with no more than a three-hour delay, and the desert winds blew down the corridors, scouring them dry and clean.

My escorts removed their helmets. Their movements were slow and measured. Perhaps even painful, I thought suddenly. They watched me closely.

Remember they are human. Remember. In the inescapable propaganda put out during the war by the Defenders of Humanity, Bestials were monstrous caricatures. Red, burning eyes. Hungry tongues lolling out between scimitar fangs. Claws reaching out to grasp and tear.

It was hard to see details. Half the glow-strips in the curved ceiling had burned out. I had an impression of elongated heads, over-large pointed ears lying flat against the skull. Dark hair, or fur, covered all the facial area except right around the eyes and the tip of the nose.

"Follow."

We walked through pools of darkness, where all the glow-strips were out. Wall vents carried the clattering wheeze of air-recycling machinery.

My escort halted before an interior lock, pushed it open, and motioned me in. Nearly a dozen Bestials sat about a long table. The combination and intensity of smells was nearly overpowering.

Near the end of the table one stood. "Welcome. I am Peacebringer Huntsman of the Beta-Zed 3000 Clan, acting commander of the *Charon* expedition. Thank you for answering our distress call. We . . . had forgotten it was still broadcasting. I suppose we had given up hope it would ever be answered."

I nodded. "Alex Raymond. I'm an astronomer with the *Endeavor*." I tried to keep from staring at the veined, fleshy growth which rooted in a nearly closed eye and hung along his cheek. It was hairless, smooth and taut.

"You are basic stock." It was half a question. The Speaker was a large Bestial to Huntsman's right.

"Right. My parents were too poor to afford even the basic chromosome cleaning. Five million years worth of mutations and recessives stand before you."

"How goes the war?" It was the same speaker, who still had not introduced himself. Anxiety edged his words.

"There is no war. It ended two—" I had forgotten to adjust for time spent in cold sleep. "—no, five years ago."

"Who won?" The room filled with a palpable tension.

I shrugged. "Nobody. As usual."

That was too glib, even for me. Each individual in the room was probably wondering if he would be interned. They deserved a better answer.

"It was pretty much a draw," I said. "I don't follow politics closely, so I can't give you all the details. There was a huge battle around Chiron, in the Centaurus A system. The Alliance was shattered. Most of the —" I caught myself.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Bestial was a term no longer used in polite company. "—the warcraft of the Confederated Clans were destroyed. Since neither side could continue fighting, they negotiated a peace."

"On what terms?" Huntsman asked.

Michelle would have been sensitive enough to know from the beginning that that would be the most important question.

"All genetic variants with at least 50 percent basic human genetic make-up, which clearly includes all of you, were recognized as fully human, and entitled to all legal rights and protections on all worlds within the Periphery."

A rustling from the back of the room, a sigh of release.

"No reparations were granted to either side. Clans were given full homestead-ownership rights of about three-fourths of the planetary bodies then under their direct control."

"Then we won!" The growl was dangerous, exultant.

"Parry!" Huntsman warned.

"I suppose so," I agreed. "I heard the casualties were very high."

"What are your medical facilities on the *Endeavor*?" a third Bestial asked.

"My understanding is that it has the most up-to-date and extensive sickbay facilities of any mobile habitat within the Periphery."

"How many of your doctors are genetically modified for work in minimally sustaining environments?" Parry asked.

It took me a few seconds to recognize the formal synoptic description of Bestials.

"None."

There was a sudden rustling. Eyes fixed on me with renewed suspicion. I bit my lip. I wasn't clever enough for a convincing lie. I hoped I could phrase the truth diplomatically enough for it to serve.

"The terrestrial commissioners have quite an inferiority complex regarding the Clans," I explained. "The treaty left the Clans in control of the Periphery. Earth sees itself closed off from the rest of the galaxy. The *Endeavor* was supposed to demonstrate that Earth could leapfrog the Periphery and regain Earth's dominance in exploration.

"Then, of course, we find you waiting for us."

"At a cost, Dr. Raymond," Huntsman said. "There were a thousand of us on the *Charon* when it began its voyage. Less than one-tenth that number remain. Most died in their cold sleep cubicles. Many of the rest of us are very ill. We need all the medical help you can spare."

"Don't beg," Parry muttered. "We don't *need* anything from any human."

It was time to get to the nub of things. "You need something even more immediately than you need our sickbay," I said. "Betelgeuse has been fusing silicon for eleven months. In a month, or less, it will explode. Prepare all your people for evacuation."

They took surprisingly little convincing. They had lived under the crimson glower of the red giant for five years. They lacked sophisticated astronomical instruments, but they had known generally where Betelgeuse was on the evolutionary sequence. Some had even speculated on the possibility that the star might supernova.

"Then why did you come here, of all

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The Shape of Things to Come

As a reader of *Analog Science Fiction/Science Fact Magazine* you are keenly interested in the shape of things to come, our potential futures, and how science and technology will affect the spectrum of human experience.

Analog Science Fiction/Science Fact Magazine challenges its readers to speculate beyond the mundane and day-to-day. We want our readers to ponder, question and debate the impact scientific inquiry and discovery will have on the way humans live, relate to one another (as individuals and nations), conserve their environment, and express themselves intellectually and artistically.

The Shape of Things to Come

In a world of mundane credit cards, the "Far Travelers" MasterCard is the only credit card created exclusively for readers of science fiction.

The unique design identifies you as an individual committed to the exploration of human potential.

When you use the "Far Travelers" MasterCard, you will help ensure humanity's continued Far Travels into space because...

Every time you buy something with the "Far Travelers" MasterCard, *Analog Science Fiction/Science Fact Magazine* will contribute a percentage of the price to the National Space Society.

The "Far Travelers" MasterCard is the only credit card that enables you to deepen humanity's commitment to the exploration of space.

- There's no annual fee for one full year!*
- A competitive interest rate of prime plus 7.7%*
- 25 day interest-free grace period when your balance is paid in full each month.*
- Instant Cash at ATMs and bank locations throughout the world.
- $250,000 Travel Accident Insurance at no extra cost.
- Purchase Security protects virtually anything you buy with your credit card for 90 days, Extended Protection doubles manufacturer's warranty for up to one year.

If you would like an application, please call (800) 641-7878.

FIRSTCITY.

First City Bank - Sioux Falls, N.A.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

places?'' I asked. Huntsman was giving me a quick tour of the base, filling me with every fact I might conceivably need to report to Kalfus. We walked through a makeshift nursery. Six babies lay in cylindrical cribs. Their skin was pink and, except for their heads, hairless. It would be several years before their genetic heritage manifested itself externally.

''Not by choice,'' Huntsman said, with a bitter laugh. His eyes looked far away. ''The *Charon* was supposed to to be the ark of our race. Some of us felt it wrong to war against the race which had created us.''

Sharpness edged his words. ''Others felt, more realistically, that the contest was too uneven, that we could not beat the Alliance, and that the Defenders of Humanity would settle for nothing less than our extermination. The Confederation of Clans had no idea how to deal with this sort of dissent. It settled on giving us a large, obsolete freighter to convert into a colony ship. With one stroke, they would get rid of the worst weaklings and cowards—and, just maybe, ensure the survival of their race if the Alliance really was too strong.

''I would like to think that none of its members had anything to do with the failure of the quantum drive.''

''What happened?'' We were in the power plant. Field generators, which had been used to power defensive shields before being ferried down from the *Charon,* hummed unevenly.

Huntsman shook his head. ''The clock function of the navigational computer succumbed to quantum stress. None of the fail-safes kicked in. We just kept on going until enough stress flaws accumulated to shut down the drive. Then the *Charon* tumbled back into normal space, initiating the wake-up sequence.

''For those of us who could wake up. Other flaws had accumulated. Too many of us woke to immediate, agonizing death. The stench permeated the entire craft. Even worse than this, yes, though you have been polite enough to pretend not to notice.

''We jettisoned the bodies. They floated around the *Charon* in a ring until we got the drive repaired. Betelgeuse was five light-years away: the nearest star with a planetary system. We limped the distance, needing raw materials for repairs. The quantum drive gave out completely as soon as we were in-system. Everything else was falling apart as well. We were only able to get into orbit and get most of our people and equipment down to the surface before the ship became completely uninhabitable. When our lander was blown into the side of the cliff, we were marooned.

''Hydroponics and air-exchangers have performed tolerably well. Stress cancers have taken the most serious toll—''

''Raymond!'' Kalfus's voice crackled across the relay link strapped to my chest. ''Get yourself and the *Bounty* back to the *Endeavor* immediately. Failure to dock within two hours of the time of this message will be considered insubordination and will be dealt with in the severest manner imaginable.''

''Severest manner imaginable,'' I muttered in disgust. Kalfus seemed to have forgotten that I was a civilian. Still, there was no reason to annoy him more than I already had.

''Get your sickest ready to leave

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

first," I said to Huntsman. "The *Endeavor* should be in orbit within ten hours."

Kalfus had pinpointed my position. It would take every minute that remained to make the deadline.

The lock area was nearly empty when I cycled through. Kalfus was waiting for me. Two ABS ratings floated at the far end of the bay, regarding us curiously.

"Mister, if it would make any difference, you would be confined to quarters for the remainder of this voyage. You are never to disobey a direct command. Understand?"

I nodded, more puzzled than daunted. As angry as he was, why was he making such an obvious effort to keep his voice below conversational level?

"As it happens, it will make no immediate difference since all of us are going to be in cold sleep within one hour. You may go to your cabin and stow your gear. Then report immediately to Youvan for hypothermic inprocessing. We are on our way back to Sol."

I shook my head. "There are at least a hundred Bestials in serious need of medical attention. We have no reason to run out—"

"Dr. Raymond, your colleagues reported to me just before you began your little jaunt that Betelgeuse has started fusing silicon into iron. I am sure I don't have to remind you what that means. Dr. Crawford estimates that we have at most—" He glanced at his wrist-display. "—twenty hours until detonation.

"I have no intention of risking the *Endeavor* and everyone on board so that you may indulge your archeological curiosity. Are you going to report on your own, or are you going to be carried to Youvan already unconscious?" He jerked his head in the direction of the ratings.

"I'll . . . of course, I will go."

"Good." The thinnest trace of a smile split his face. "Don't bother talking to anyone on the way."

It was as if he had not heard a word I was saying. Weightless, I pulled myself along a brachirail to my quarters. Thoughts tumbled about in disorder. Kalfus had been angry, but kept his voice barely above a whisper. Why? He had brought along goons in case he needed to subdue me, but then kept them as far away as possible. Again, why? For that matter, why had the captain deigned to come down to the lock area at all, when he could have had me report to the bridge and blistered my ears there?

Suddenly, I realized the one answer to all these questions. Kalfus knew, at least well enough to fear, what I was going to say. He did not want anyone else to know. If there were humans in-system, even Bestials, he would have a dilemma. Therefore I would have to be silenced, as gently as possible, as forcefully as need be. For himself, he would pretend he did not know. I would be in no position to contradict him later.

Swinging around a corner, I collided with Michelle. We both let go and tumbled rapidly about until we grabbed onto different sets of brachirails to reorient ourselves.

"Alex!" Michelle gasped. "Thank God you're back. Wagner said you had gone off trying to trace some aberrant radio signal. We couldn't contact you when we saw the iron in this morning's

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

readings. I was afraid Kalfus might leave without you."

I braced both hands against the brachirail, killing my excess spin. "The signal was a distress call," I said. "There are nearly a hundred Bestials marooned on the satellite of a gas giant about a light hour above the ecliptic."

She shook her head slowly, her eyes never leaving mine. "That's . . . terrible. What are we going to do? We can't just leave them."

The smallest stimulus can have far-reaching effects on a properly primed system. Superheat a cup of water in a microwave oven. When you take it out, it will appear perfectly normal. But drop a spoon through the surface and it will erupt into a boil until nothing is left.

Or supercool the same cup. Drop in an ice shard. Within seconds, the entire volume will freeze solid.

I had not realized how much old habits were reasserting themselves. *Stay aloof. Avoid confrontation. Let the others maim themselves. Walk away from emotions, for they are chaotic and deadly.*

A numbness as comfortable and familiar and suffocating as an old blanket. With one question, it fell away completely.

"I am going to force the Captain's hand. You are going to aid me by remembering what I have told you about Bestial survivors and repeating it to everyone you meet. Ask Kalfus to come looking for me in about . . . one hour. If it doesn't occur to him earlier."

"What—"

"Go *now*. I don't have time for more explanations."

She turned reluctantly.

"If we had world enough, or time," I said, surprised at the words which came forth on their own, "I would love you, Michelle Freschetti. Not for any of the good or usual reasons but because you make me realize that I may be a much better person than I ever would have guessed."

I swung away before she could react. If charitable, she must have thought I had gone completely insane.

4. Collapse

The *Bounty* zigzagged down through the clouds, twisting into the wind, skittering before it when it blew too strongly, or in the direction of the Bestial base. In only a few minutes, it had touched down at the base of the cliff.

So far, so good. I had been afraid I would fall into normal space only to find the *Endeavor* awaiting me—an all too possible eventuality since it could speed through $Space_4$ at sixty-four times my top velocity.

Now all I needed was for two more longshots to go my way.

I had radioed the outline of the situation ahead of me. Huntsman asked the crucial question as soon as we snapped open our helmets inside the airlock.

"How much time do we have?"

I shrugged. "The head of the astronomical contingent thinks twelve hours. It could be as much as twenty-four. Or as little as zero. The secondary star orbiting beneath the chromosphere throws a big variable into all our calculations."

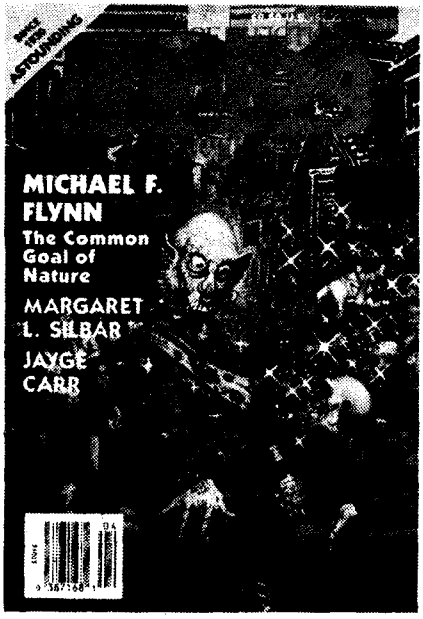
Bestials scurried by us in the corridor. In one bay, a crew was checking out vaccuum suits and ordering them by size.

"We have more of them than we have

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

THE PAST, THE PRESENT, THE FUTURE, THE UNKNOWN.

SUBSCRIBE NOW AND SAVE 34% OFF THE COVER PRICE
CALL TOLL-FREE 1-800-333-4561



YES SEND ME

☐ 18 issues for only $29.50

☐ Please send me 12 issues for only $19.97

SCIENCE FICTION
analog
SCIENCE FACT®

Mail to: P.O. Box 7060, Red Oak, Iowa 51591

Name_____

Address_____

City_____

State_____ Zip_____

Please allow 6-8 weeks for delivery of first issue. *Outside US & Poss. 12 for $22.97, 18 for $33.97.*
All foreign orders must be paid in advance in U.S. currency.

HFSC-1

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

living colonists," Huntsman muttered. "Whether the oxygen generators are sufficiently charged or not is another story."

There were fewer people in the meeting room than on my first visit. These would be the most important leaders. Everyone else would be packing as quickly as they could.

"We received your message," Parry said shortly. "What do you plan to do?"

"I want to get you ready to leave immediately. My captain would have preferred to ignore my report and leave without you. However, he cannot ignore my absence and that of the *Bounty*. I have made myself a hostage to ensure the captain's honor."

"*And if he leaves without you and your craft?*"

"I shall be terribly disappointed," I said simply.

As if on cue, static crackled from my chest relay. I unstrapped it and the miniature instrument display, and put them on the desk so that everyone could hear.

"Raymond, return immediately—"

"Captain, *Charon* Station needs another—" I looked over at Huntsman, who grimaced, then opened and closed his hand three times quickly. "—fifteen minutes for the first contingent to be ready.

"In the meantime, the officers of the *Charon* expedition wish to convey their compliments on your spacemanship in bring the *Endeavor* so far, and on the honor and bravery of your crew and the Terrestrial dependencies for risking so much for the sake of your former enemies."

That brought a growl from Parry. Well, I had been laying it on thick, but part of that came from being lightheaded with relief. Kalfus's voice had come over normal radio channels and had fallen silent at my interruption. That meant the *Endeavor* had to be in orbit almost directly above.

Two out of three longshots. The last should be the easiest.

Kalfus had to be speaking on a channel open at least to his bridge crew. If I played it right, I could force him to rescue us by giving him the credit for the entire operation.

By making the alternative a public declaration that he was a coward, that he was getting the hell out immediately and leaving the rest of us to die.

Huntsman had been rubbing his chin, *nodding slowly. He leaned over the relay.*

"Captain Kalfus, my name is Peacebringer Huntsman, acting commander. We have a navigational beacon broadcasting for your shuttles. From what Dr. Raymond tells me about their capacity, I estimate that this entire evacuation can be completed in just over an hour."

"Commander Huntsman—"

A blue dot flashed on the display. Then a dozen more. Then a deluge, splashing the entire screen a brilliant, deadly blue. A series of numbers burned across the screen so brilliantly and quickly that I seemed to see them only in after-image.

The lights dimmed, died, flickered back to fitful, yellow life. Intermittent blue pinpricks showed on the display.

"Those were our defensive shields which just kicked in," Parry said, advancing on me. "We must be under attack. You came back to make sure we would respond to their hail, to give them

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a nice, clear signal for the sighting mechanisms of their weapons."

I shook my head, hardly aware of him. "The core . . . " I licked my lips and swallowed, trying to make my voice work again. "The core of Betelgeuse just collapsed. Your defenses were triggered by a neutrino storm escaping the rebound.

"The shockwave—" I visualized it churning outwards at 11,000 meters a second, transmuting star stuff into calcium, uranium, lead. . . . "—will reach the surface in about one hour. The surface will flare ultraviolet and scour the entire system even before the rest of the explosion turns these worlds to superheated gas."

"The *Endeavor*?" Huntsman asked.

"We won't be able to communicate until the neutrino strorm lets up. That will be another minute or so. It doesn't matter. The *Endeavor* left as soon as the neutrino wave front hit."

"Leaving us to die," Parry said. His voice had thickened to a constant growl. He grabbed me just below the neck and swung me against the wall. There was an almost sickly sweetness as suit sealant oozed into the punctures made by his claws.

"But they left a ship within reach. Maybe they thought we were too sick and weak to take it. They were wrong. Only a few of us will fit into it. But you, human, will certainly die."

The claws raked across my throat. I tried to breathe through a nose pressed flat against the ceiling. Sick as Parry might be, he still could still turn me into a pretzel.

His arm jerked convulsively. For an instant, I feared the claws would open my windpipe. Then I found that I could look down. Parry's face was very close. His mouth opened wide. A sharp tongue, streaked with blood, pointed at my eyes. Then I saw his real tongue lying below.

Suddenly, I fell to the floor. I leaned against the wall as Parry collapsed at my feet. Only then could I see the knife hilt buried in the base of his neck.

"Death is bad enough," Huntsman said, "but we have had years to come to terms with it. Dishonor, treachery, senseless killing . . . we left the Periphery to escape all these things.

"When the neutrino storm abates, you may leave. Perhaps by yourself, you may still escape."

"No," I said, tearing my eyes away from Parry's corpse. "No one else will die." I looked around. "Every one will be saved. But we must work quickly."

How long it took to talk, to explain, to explain again, to get people moving, to suit up. The inexorable march of seconds as they moved from the station across the rocks to the *Bounty*. Shifting the *Bounty* so that they could crawl up the probe racks and strap themselves in with padded monofilament.

There were no suits for the smallest children. They were carried in adult suits and deposited inside my cockpit, packed together in the tiny galley, the toilet closet, the few cubic meters directly behind my pilot's chair. The older children had charge of the babies. Huntsman, wedged against the wall, had charge of them all.

I initiated the launch sequence. The *Bounty* rose at a steady one gee acceleration. Clearing the cliff, it staggered and gave way before the gale. Salvador

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Dali to the contrary, cruciform is not aerodynamically sound design. Still, it kept rising.

We lifted above the lower cloud layer. I had only an instant to spare for the scene. Clouds thrust up in spires and minarets, their purple silhouettes edged with crimson. Above, a higher level of cloud stretched like a dimpled, violet dome. Betelgeuse lay on the horizon, glaring in the agony of its impending destruction.

Anger rose out of a deep sadness, that such beauty seen this briefly would be wiped forever from the Universe.

We pierced the top layer of clouds. The sky darkened as the horizon curved and fell away.

The *Bounty* turned, trying to match its pre-programmed vector. I still dared not accelerate at more than 1.25 gee. Even padded monofilament could slice through vacuum suit plastic (and much more easily through flesh) if pressed too severely.

Needles monitoring ultraviolet radiation quivered nervously. If they spiked, the *Bounty* would automatically jump ten light-minutes along whatever the current vector there was. God willing, that would give me enough time to attain the proper vector before the wave front caught up with me.

The vectors aligned; real approached the asymptote of the ideal. Drive lights flashed their warnings. Sensor needles swung hard right.

The *Bounty* leaped into $Space_2$. Suppressor fields hummed to life, extending beyond the ends of probe racks. In the instant before the field attained full strength, Huntsman's tumor shredded, sending blood cascading down upon me.

5. Transmutation

Almost two hours later, the stars ripple back into existence. The chill of shift hysteresis flashes through me as the suppressors switch off.

B2, swinging 48 AU from Betelgeuse, burns brightly below us. My instruments scan for the *Endeavor*. I pick up a navigational signal almost at once. But alongside that pure tone is another signal. A thunder of voices fills the cabin.

" . . . Denn es wird die Posaune schallen
und die Toten werden auferstehen unverweslich . . . "

Brahms defiantly giving the finger to death. I smile, thinking of whom I have to thank for this greeting.

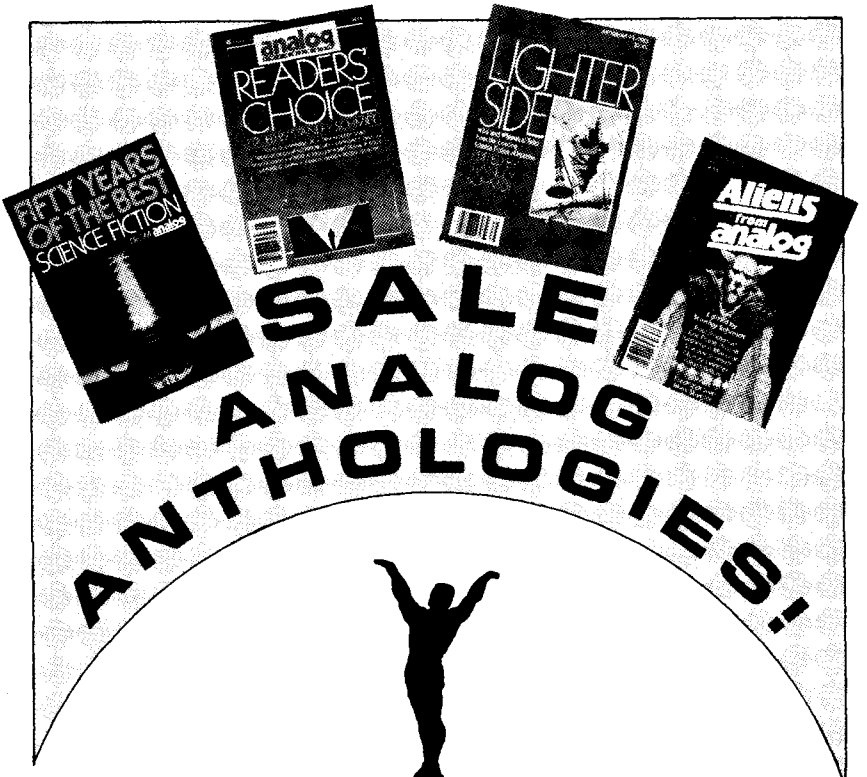
The *Endeavor* enfolds us within its outer hull. I emerge from my cabin blinking. Ratings vainly attempt to keep order as the Bestials detach themselves from the probe racks and swirl through the lock area like an animate snowstorm.

Two figures launch themselves at me. The smaller arrives first, clasping her arms around my neck.

"I thought you were dead," Michelle gasps, pressing her wet face into my chest. "I made Kalfus drop the probe to broadcast our coordinates, but I was afraid the neutrino storm destroyed it. Then when you did not appear an hour ago, Kalfus began a seventy-five minute countdown, saying if you weren't here by the end of it, there would be no point in waiting."

Dr. Youvan floats up more slowly,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Over 2,000 pages of astounding stories and articles. The entire set is on sale for only $29.97. Or you can buy individual books to fill in your collection.

Please send me the *Analog Anthology Set* (8 books) for only $29.97. I have enclosed my check for that amount.

Name _____

Address _____

City/State/Zip _____

HFGC-6

Mail to: *Analog*
P.O. Box 40
Vernon, N.J. 07462

Please send me the individual Analog anthologies indicated. Enclosed is my check or money order for $ _____.

CLASSIC ANTHOLOGIES

- ☐ #1 FIFTY YEARS OF THE BEST ($5.50)
- ☐ #2 READERS' CHOICE ($4.50)
- ☐ #3 CHILDREN OF THE FUTURE ($4.50)
- ☐ #4 LIGHTER SIDE ($4.50)
- ☐ #6 WAR AND PEACE ($4.50)
- ☐ #7 ALIENS ($4.50)
- ☐ #8 WRITERS' CHOICE. VOL. II ($4.50)
- ☐ #9 FROM MIND TO MIND ($4.50)

Please allow 6-8 weeks for delivery

For orders outside the United States please add $6.00 for foreign postage.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

breaking her momentum on a handhold. "The point is that we were waiting for *you*. How do you expect us to handle all these refugees? I'm not even talking about food reprocessing. I am talking about cold sleep cubicles. We don't have nearly enough extras, and we have no way of making more!"

"I'm sure you'll think of something," I say. "After all, you landed this job because you were . . . were- . . . " I lose my train of thought, distracted by Youvan's expression.

"The Bestial base," Youvan says, her tone totally altered. "It had shielding against the neutrino storm, didn't it?"

"Certainly," I reply. "It just took a few seconds to power up. The base was in pretty decrepit condition."

Michelle looks up at me, and her face mirrors Youvan's.

Beat.

I am between Michelle and Youvan, floating down a corridor I do not remember.

". . . Where most of the energy goes," Michelle is muttering. "Shock wave and light are only in noise level."

"He should be dead already," Youvan says angrily, as if upset with me for being alive. "I can't imagine why those Bestials haven't collapsed. Maybe they are the master race, after all."

More is said. I find it hard to concentrate on the words. For a time, I dwell on the image of the shock wave racing through Betelgeuse, transmuting carbon, silicon, and oxygen into all the higher elements. After a while, I realize that the star is within me, by reason of the neutrino storm. I suffer a star-change, into something rich and strange.

The room tilts around me. I am gently guided into a cold sleep cubicle.

"There isn't time to start treatment," Youvan explains. A vibroblade appears in her hand. It vanishes below my line of sight. A thin stream of air brushes down my sternum, across my navel and abdomen. My clothes flower upward. Michelle helps strip them off. Youvan cinches the chest monitor straps tight around my neck and back. She inserts the catheters into the implanted plugs beneath my left armpit and at the base of my neck.

Michelle stares down at me, her face furrowed with concern. Off to the side, Youvan says: "His whole biochemical structure is falling apart. If I can keep him from dying immediately by chilling him down, I can buy the time I need to do the necessary repair work. Maybe."

Michelle's face sinks down and is replaced by the gleaming silver interior of the cold sleep cubicle. Already, comforting cold draws me deeply into its embrace, banishing pain, promising dreamless sleep. But before the cubicle is sealed, extinguishing the light, I see another figure floating above me. Uncle William as I last saw him, blood seeping from the side of his mouth.

I have done as you would wish. I think I have learned what you tried to teach. Are you pleased with me?

Perhaps. My last sight, as the light winks out, is a smile on those dying lips. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Martyn J. Fogg

ASTROPHYSICAL ENGINEERING AND THE FATE OF THE EARTH

We face some ecological problems that look pretty big to us. But wait till you see what our remote descendants may be up against—and what they might do about it!

Do not go gentle into that good night,
Old age should burn and rave at the close of the day;
Rage, rage against the dying of the light.

DYLAN THOMAS

We have all heard the doom-ridden pronouncements that human activities are on the brink of causing an ecological catastrophe. *Homo sapiens* have already exterminated a large number of species through hunting and destruction of their habitats. However, this damage to the biosphere may be slight compared with the potential harm caused by the man-made climate changes forecast for the next century. It is improbable, though, that mankind yet has the power to wipe out all life on this planet, from the most majestic whale to the lowliest virus. However, the astronomers among you will know that the Earth as an abode for life will not last forever. The Earth's biosphere, and perhaps the planet itself, is doomed to destruction by a natural process—the aging of the Sun.

Doomed? Members of a terrestrial civilization existing in those far distant times may not like the sound of that word, or its implication, but would there be anything they could do about it?

Analog readers will be familiar with the concept of terraforming, a process whereby the environment of a planet is artificially modified towards a state of Earthlike habitability. Such planetary engineering projects are vast and ambitious in terms of what human civilization is presently capable. But consider

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

now *astrophysical engineering*, a term that invokes even grander visions of what a truly advanced civilization might be capable of. The subject matter of astrophysical engineering projects would not be just planetary surfaces, but entire planets, stars and maybe even galaxies.

An arbitrarily advanced civilization would be able to achieve anything not ruled out by the laws of physics—they would have the capability to be astrophysical engineers. Would their astronomers think the Earth doomed, or might they consider a bolder plan to save not just the population of the Earth, samples of its biosphere and artifacts of its culture, but to preserve the entire planet?

THE SUN'S ADVANCING SENILITY

The Sun is a well-behaved middle-aged star on the *main sequence*, where thermonuclear reactions in its core, the fusing of hydrogen into helium, provide a steady flow of energy that has maintained life on Earth over a period of billions of years.

As a star ages, helium accumulates in the core, as a sort of inert "ash." It is the slow accumulation of this "ash" and the gradual contraction of the core that causes main sequence stars to gradually brighten with age. The Sun is thought to be about 30% more luminous now than it was four and a half billion years ago when newborn. This increase in energy output, imperceptible over the length of human history, does not appear to have caused any major problems for terrestrial life so far. However, much more drastic changes characterize stellar evolution, and will affect the Sun, when the core has used up all its hydrogen. Thermonuclear reactitons cease there, but continue in a shell surrounding the core. As the mass of the inert core grows, it contracts, heating up the hydrogen burning shell above, greatly increasing its energy output. There comes a point when the mass of the core reaches about 12% of the mass of the star, the so-called Schönberg-Chandrasekhar limit, when the star can no longer adjust to this extra energy production by making small changes in its radius and surface temperature. Within a few million years, the star alters its structure drastically. It swells up to become a huge, distended red giant. Five billion years in the future, the Sun may be a hundred to a thousand times more luminous than it is now, and its surface may lie somewhere in the vicinity of the orbit of Venus. At the very least, the Earth's atmosphere will be stripped away and its surface melted to slag. More probable, perhaps, is that it will be engulfed by the Sun's outer layers and vaporized—a whiff of silicate gas into the surrounding inferno. Now that's a real ecological catastrophe!

Now, five billion years is a long way off. However, the Earth may not just be at risk from the Sun when it reaches its red giant phase. NASA planetary scientist James Kasting has calculated that in a billion years time, when the Sun is a mere 10% brighter than it is now, the Earth could be at risk from a runaway greenhouse effect. The climatic feedback mechanisms that have kept comfortable conditions on the planet

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

since shortly after its formation will be put under such strain they might start to falter and break down. The oceans will start to evaporate, increasing the amount of water vapor in the atmosphere, which absorbs more solar energy, warming the planet still further, causing more evaporation and so on. The Earth's climate will be driven towards a radically new equilibrium. Surface temperatures will soar, baking carbon dioxide out of carbonate rocks, leaving the Earth resembling a second Venus. This climatic cusp catastrophe would occur quite rapidly, at least when measured on geological timescales. There is no biosphere we know of that could flourish, let alone survive, under those conditions; and if one were possible, it would have no time to evolve.

A billion years is only about a quarter of the time for which the Earth has been in existence, which means that the time alloted to life on this planet could be four-fifths, rather than half, through. However, the exact timescale, one billion years, five billion, or somewhere in between, is of secondary significance to the fact that the final day when the curtain comes down remains very distant. In light of this, who cares, you may ask? *Homo sapiens* will be long extinct and maybe Earthlife will have been scattered throughout the Galaxy by then, so what does it matter? Well, I suppose it doesn't really matter, but nonetheless, I have a sentimental attachment to my home planet. So let us speculate how an advanced future civilization of astrophysical engineers, maybe distant descendants of humanity, or springing from some other origin altogether, might pluck the Earth from the Sun's flames and preserve the planet intact as an abode of life long after its parent star has died.

EARTH SHIFT

One obvious way to protect the Earth from the Sun's growing luminosity would be to expand its orbit so that it remains within the Sun's habitable zone. For the next five billion years such orbital tampering need only be modest. However, once the red giant phase commences and the luminosity of the Sun increases by several orders of magnitude, the Earth would have to be relocated in the distant reaches of the outer Solar System to be safe.

In 1982, the Swiss physicist M. Taube wrote a paper in which he outlined just such a scheme. He named it "Earth Shift," where an advanced future civilization maneuvers the Earth a safe distance from the swollen Sun. In fact, he went further and speculated how the Earth might be maintained far beyond the red giant phase when the Sun had truly died and had become a shrunken black dwarf.

Using rocket propulsion, it is feasible, in principle, to alter the trajectory of a planet, just as it is with much smaller bodies such as spacecraft. Taube envisaged a one billion year period commencing with the construction of enormous, 20 kilometer high, fusion rocket motors, ringing the Earth's equator. These engines would be arranged in 24 clusters of 10 and designed to fire for 1 second each at intervals of 10 sec-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

onds as the Earth's rotation brings them into the correct position. He estimated that the shift would require a peak power output of 8.3×10^{17} watts, which could be produced by the fusion of 2.4 tonnes of deuterium per second. Rocket thrust would be obtained by using the deuterium to energize fifteen thousand tonnes per second of hydrogen propellant. The total amount of fuel and propellant required for this planet-sized rocket motor would be enormous, about 8% of the mass of the Earth itself! Acquisition of this material would be an enormous undertaking in its own right, involving a continuous mining of hydrogen from Jupiter and its transportation to the Earth.

By the end of a billion years of continuous use of this rocket system, the Earth would have become a satellite of Jupiter, but Taube admits that this would not be far enough from the Sun to withstand its maximum luminosity. He speculates that, during the time of peak brightness, the Earth's albedo (its reflectivity) would have to be artificially enhanced, but does not suggest how this might be done. Obscuring the Earth behind a large occultation disc, like an enormous sunshade, is one idea that springs to mind.

Once the Sun's fires begin to fade and it collapses into a white dwarf star, the Earth now has the opposite problem to being overheated. Now it would be in danger of being deep frozen. It would not do any good to move Earth back in towards the remnant of the Sun. For a start, young white dwarfs, whilst small, are very hot and thus emit most of their energy in the dangerous high frequency regions of the electromagnetic spectrum. Sunlight that consists mostly of far ultra-violet would not be beneficial. Moreover, to receive enough illumination the Earth would have to be moved so close to the Sun that the effects of tidal forces slowing down the planet's rotation would also pose a serious long-term problem. Taube suggests instead that an artificial sun be constructed close to the Earth, fueled by deuterium mined from Jupiter. Perfectly efficient burning of deuterium and perfectly efficient focusing of the resulting energy onto the Earth could provide the Earth with illumination for over a hundred billion years. Again however, Taube does not elaborate on the design for such a wondrous device. It is merely a concept, based on simple arithmetic and even simpler assumptions.

The only design for an artificial sun that I know about and which would be capable of warming an entire planet was presented by myself in a previous article in *Analog*. It was an idea for stellifying Jupiter—an astrophysical engineering process whereby the planet as a whole might be converted into an artificial star by seeding it with a primordial black hole. As the hole grows by accretion, enormous quantities of energy are released, giving Jupiter the appearance of a red dwarf star. Unfortunately, however, after a few tens to a few hundreds of millions of years, Jupiter would have disappeared down the hole, rendering the scenario in this case rather pointless, as this period of time is shorter than that required to move the Earth into the vi-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

cinity of Jupiter in the first place.

The Earth Shift concept, as outlined by Taube, can be objected to in a number of areas. First of all, the rocket power required is about five times the total solar power input to the entire Earth! I have my doubts that the Earth would remain habitable for long under the glare of enormous thermonuclear explosions, one every second, being released a mere twenty kilometers above the surface. It would not do if the Earth was a charred and lifeless cinder by the time it had retreated a comfortable distance from the Sun! However, let us assume that it were possible to safely shift the Earth into orbit about Jupiter, and that the planet could be protected during the Sun's violent death throes. The Earth would then be in the unsatisfactory position of requiring an eternity of artificial illumination and would depend entirely for its continued habitability on the persistence of an advanced civilization, capable of feeding the fires of the artificial sun.

STAR LIFTING

An alternative approach to relocating the Earth into the outer Solar system might be to tamper with the Sun itself, in some way that increased its life span.

Now, the two major characteristics of a star that are of interest to us, namely its luminosity and life span, are sensitively dependent on its mass. As a rule of thumb, the luminosity of a star is proportional to between the third and fourth power of its mass. The life span is proportional to the mass divided by the luminosity; i.e., it is proportional to the mass raised to the power minus two to minus three. Thus, a star of half a solar mass, for instance, would remain on the main sequence for between four to eight times as long as the Sun. For a planetary system about a star of this mass, the red giant disaster would be tens of billions of years more remote. Would it be possible to reduce the Sun's mass to extend its lifetime?

David Criswell, a consultant to the California Space Institute, has outlined a number of ideas for extracting mass from stars, a process he has termed "Star Lifting." One of them, with the delightful name of the "Huff-n-Puff" method, involves a ring of ion accelerators orbiting the Sun and exchanging two counter-directed beams of oppositely charged ions. A circum-solar current is set up producing a powerful magnetic field, leaving two polar holes through which plasma can escape. Criswell suggests that the upper atmosphere of the Sun in the polar regions could then be heated and expelled like the gas from a rocket exhaust using solar powered lasers or particle beams. He estimated that if 10% of the Sun's energy were to be utilized for this purpose, then the star lifting rate would be about 3×10^{-9} solar masses, equivalent to about a tenth of a percent of the mass of the Earth, per year.

Efficient use of solar energy was Criswell's intent behind the Star Lifting concept. The aim was to reduce the mass of the Sun to 8% of a solar mass, the minimum mass of a star that can still sustain hydrogen burning. He estimated that the life span of this stripped down

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Sun, now transformed into a tiny, dim, red dwarf, would be extended to a colossal twenty-three thousand billion years, over a thousand times the present age of the Universe! The mass lifted from the Sun would be used for the construction of a number of other miniature long-lived stars. Thus, the Solar System would be replaced by a cluster of 12 red dwarfs, each orbited by clouds of space habitats and whichever planets had been allowed to persist undemolished.

However, there are difficulties with this scenario as well. One of the curious things about stars is that both adding and *subtracting* mass tends to accelerate their evolution. The reason for the former is obvious, but for the latter it is more subtle. If material is stripped off the outer layers of a star then, true, we have a star of lower mass and therefore a star that should burn its fuel more slowly and last longer. However, the ratio of core mass to the mass of the whole star has been increased and so we have a lighter weight star that "thinks" it is older, or more evolved, than it really is. Removing 92% of the mass of the Sun would leave just the core behind, which would then rapidly evolve into something resembling a hot, dense, white dwarf star, not the placid lower main sequence red dwarf that Criswell suggests. A more modest reduction in the Sun's mass might indeed extend the Sun's lifetime, but not to the extent that the simple mass/luminosity proportionality indicates. If too much of the Sun's envelope were to be removed, driving the core/star ratio beyond the Schönberg-Chandrasekhar limit, then disastrous changes within the Sun might be triggered, such as the creation of a premature red giant.

Another problem is that a large modification of the Sun's mass and luminosity would require large alterations in the Earth's orbit, with all the difficulties described in the previous section. Theoretical studies of extra-solar planets have also shown that there is a minimum mass for a star commensurate with the existence of a habitable planet in its system. Below about 0.7 - 0.8 solar masses, the habitable zone is so close to the star that tidal forces rapidly de-spin any potential Earth so that one hemisphere always faces the star. A star of 8% of the mass of the Sun could certainly support a cloud of artificial space habitats, but not the Earth.

What hope then is there for the Earth in five billion years' time; is the choice incineration or an eternity of artificial maintenance? Maybe not, for there is another way: to replace the Sun with another star entirely.

SOLAR EXCHANGE

The notion of swapping the Earth's sun for a much younger star seems, at first, even more improbable and outrageous than the scenarios I have described above. However, this was suggested, as an aside, in a paper written by Los Alamos astronomer J.G. Hills in 1984. Hills has published a large amount of research based on his computer simulations of close stellar encounters. In the paper in question, he was examining the outcome of simulated encounters between a one solar

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

mass star, orbited by a single planet, with an intruding star of one solar mass. He found that if the closest approach of the intruder is two to three times the radius of the planetary orbit or less, then the encounter tended to expand the orbit of the star/planet system, or even to dissociate it. A large proportion of the encounters that did not result in dissociation resulted in the intruder capturing the planet into an orbit of average eccentricity about 0.7. (The eccentricity of an ellipse, e, is measured between zero and one, and represents how elongated an orbit is. To give some examples, Halley's Comet has an eccentricity of $e = 0.967$; the planets, except for Pluto, have $e < 0.2$). However, Hills noted that out of the 4,496 simulated encounters with parameters appropriate to the Sun/Earth system, 2 encounters resulted in capture into an orbit of $e < 0.1$ and 7 in which $e < 0.2$. This led Hills to speculate that any "advanced terracreatures," as he termed them, who might exist in the distant future might plan a carefully phased encounter with a new sun which would capture the Earth into a stable, near circular orbit. He noted that a problem might be caused by the high eccentricities of other planets perturbed by the encounter, but this might be overcome by using careful timing.

I decided to look at this process in more detail and eventually published a paper on "Solar Exchange," in *Speculations in Science and Technology*. Planning the replacement of the Sun could be done millions of years ahead of the red giant catastrophe. There would be ample time in the last billion years of the Sun's life to select the right star, alter its course, and determine its time of arrival exactly with the configuration of planets most likely to result in an acceptable post-encounter situation.

There would be plenty of nearby sunlike stars from which to choose the Sun's successor. Stars pass by the Solar System at a velocity of about thirty kilometers per second. If we take a minimum timescale of a million years to carry out the Solar Exchange, then such stars would travel, relative to the Sun, about one hundred light-years in one million years. With the local stellar number density being about 0.0028 stars per cubic light-year, this gives a total number of twelve thousand stars within a hundred light-years, about three hundred of which would be solar type single stars. Many of these would be less than half the age of the Sun and thus possible candidates for exchange. Should a star be given an impulse whilst still far off, the course alteration necessary to bring it on a collision course with the central Solar System would be quite low.

However, didn't I elaborate above just how difficult it would be to maneuver a planet? What hope therefore would there be for moving stars? Stars also might be propelled by rocket propulsion, but this time using some of their own substance as reaction mass. The Star Lifting concept of Criswell might easily be adapted to this purpose. If mass is just ejected from one pole, instead of both, then the star would receive an equal and opposite reaction and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

can indeed be said to possess rocket propulsion (see figure 1). If this method is to be used, though, it would be important, for the reasons already discussed, that the mass lost from the star's outer layers be as small as possible. The Earth's new sun would have to be stable and similar in mass to the aging star it is to replace.

Table 1 shows the results of calculations presented in my paper, in which it is assumed that the exhaust velocity of the stellar rocket would be six hundred and twenty kilometers per second, the

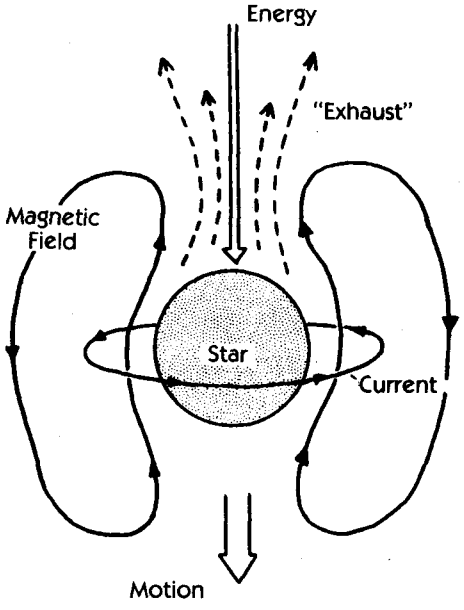


Figure 1: The Stellar Rocket Redrawn From *Spec. Sci. Technol.*, 12, 153 (1989).

TABLE 1

Δ V (km/s)	Θ°	M	P	T (Myr)
1	1.9	0.998	0.002	0.7
2	3.8	0.997	0.003	1.0
5	9.5	0.992	0.008	2.7
10	18.4	0.983	0.016	5.3
20	33.7	0.967	0.032	10.7

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

same as the escape velocity from the Sun. The headings in the table are explained as follows: Δ V is the amount by which the star's velocity is altered; Θ is the direction change achievable by thrusting at right angles to the direction of the star's initial velocity of thirty kilometers per second; M is the proportion of the star remaining after completing the maneuver; P is the proportion of the star's mass used as propellant, and T is the total time elapsed in millions of years. Since there would be numerous stars to choose for the exchange, it is likely that there would exist a candidate for which only a small velocity increment would be required to bring it on collision course with the Solar System. Table 1 shows that the amount of reaction mass required, in terms of the mass of the star, is very modest and that the time to carry out the maneuver would be between one and ten million years.

THE STARS IN THEIR COURSES

Of all the astrophysical engineering techniques considered in this article that might be used to extend the Earth's habitability, Solar Exchange seems to present the fewest conceptual problems. Earth Shift has a project duration estimated to be a hundred to a thousand times longer and would probably damage the Earth severely in the process. Star Lifting, if overdone, would probably destabilize the Sun and reduce, rather than extend, its stay on the main sequence.

Since Solar Exchange has no present practical use for us, and is far beyond present technology, it is easy to dismiss the concept as pure science fantasy. However, there may be other civilizations in the Galaxy who might consider it relevant to their own near future: civilizations based in planetary systems about a star, either far older than the Sun, or more massive and short-lived, who may be facing the Red Giant catastrophe right now. Should some of them have decided not to evacuate their homeworlds, but to take their homeworlds with them, then their rescue efforts might be something we can observe from the Earth. A careful statistical study of relative stellar motions, particularly between stars of similar mass, may reveal the Galaxy not to be as wild as it looks.

Maybe four to five billion years from now a tropical Earth will bask under the heat of a warmer Sun. The length of day will be several hours longer, the sea level higher, and the map of the planet will have changed out of all recognition. The ice caps will have gone and mountain ranges will be less frequent and more eroded. Earth's crust moves more sluggishly, reflecting the dwindling of its internal fires. The land is green to the poles. There is life in the old planet yet, but the battle between the living biosphere and non-living external influences for control of the climate of the planet is soon to be lost. Even the use of terraforming technology, such as artificial ring systems and orbiting sunshades, cannot stave off a drastic change in climate for much longer. The balance between precipitation and evaporation

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of water will soon be upset, the oceans will boil, sterilizing the planet. Life on Earth is close to its end.

However, in the last few centuries a star has been growing steadily brighter in the night sky. Diverted from its course a million years ago, it has only recently become a truly spectacular sight. For a while it has been visible in the daytime and some say they can discern a tiny disc, though as yet it gives no perceptible heat. Crossing the orbit of Neptune, the intruder has less than five years to go before it reaches closest approach to the Sun, just inside one astronomical unit. Then, there will be a short period when two suns, of almost equal brilliance will shine in the skies of Earth. Tides, the like of which would never have been seen before, will grip the planet, reflecting the two star's competing gravitational influences. There will be a year of unprecedented heatwave and hurricane, flood and earthquake. However, from the time of closest approach, it will not be the intruding star that will recede, waning in brilliancy until it becomes nothing more than another dot in the night sky. This will be the fate reserved for the Sun. For the Earth, recovered from the trauma of its exchange, will now be orbiting a new sun, one that will allow life to continue for billions of years into the future.

REFERENCES

Crisell, D.R., "Solar System industrialization: Implications for interstellar migrations." In: Finney, R. & Jones, E.M. (eds.) "Interstellar Migration and the Human Experience," pp. 50-87, University of California Press (1985).

Fogg, M.J., "Solar Exchange as a means of ensuring the long term habitability of the Earth," *Specul. Sci. Technol.*, 12, 153-157 (1989).

Hills, J.G., "Close encounters between a star/planet system and a stellar intruder," *Astr. J.*, 89, 1559-1564 (1984).

Kasting, J.F., "Runaway and moist greenhouse atmospheres and the evolution of Earth and Venus," *Icarus*, 74, 472-494 (1988).

Taube, M., "Future of the terrestrial civilization over a period of billions of years" (Red Giant and Earth Shift), *J. Br. Interplanet Soc.*, 35, 219-225 (1982).

■

MOVING? If you want your subscription to *Analog* to keep up with you, send both your old address and your new one (and the ZIP codes for both, please!) to our subscription department: Box 7061, Red Oak, Iowa 51566.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

futures

Matthew J. Costello

What's your opinion of *Star Wars*?

If you were there from the beginning, when George Lucas's epic stunned movie-goers, you know the impact "The Force" had. We watched the merchandising spin to heights undreamed of by Madison Avenue, as each new film added to the mythos . . . while somehow diluting the power of the first film's vision.

Recently I reevaluated *Star Wars* for a retrospective of SF films of the seventies. My thesis was that *Star Wars* ushered in the era of the hollow SF special effects extravaganza. It took the marvels pioneered by Stanley Kubrick in *2001: A Space Odyssey* and harnessed them to space opera. All the realism, the detail, and the pretensions of *2001* were jettisoned for swash-buckling adventure in a distant galaxy, long ago.

Star Wars (1977) ended the trend of thoughtful, downbeat, and metaphysical SF, from Lucas's own *THX 1138* (1970) to Nicholas Roeg's *The Man Who Fell to Earth* (1976). And *Star Wars* pointed the way to the new Hollywood gold mine—the big SF picture, with people flocking to experience the sound and fury over and over again.

Harlan Ellison once credited *Star Wars* with, "all the smarts of a matzoh ball." And the small TV screen can make you wonder what everyone got excited about.

But now you can experience *Star Wars* in a close simulation to its original format, and view the film freshly . . . with interesting results.

CBS Fox Video (1211 Avenue of the Americas, New York, NY 10036) has issued a special wide screen edition of the film on laser disc. This version is letterboxed, presented in the original aspect ratio as seen in movie theaters. For years, this has only been available on the Japanese editions of the laser disc.

This means that now you can see the whole film, Lucas's composition, and the detail that fills the planet of Tatooine and the stars above. The disc also has matrixed Dolby Surround sound tacks so the power of the sound effects can be experienced in your living room, from that first moment when Princess Leia's cruiser glides across the top of the screen, to the ending sequence, where the heroes receive medals for their valiant service.

While letterboxing means that a part of your screen is black at the top and bottom, it immediately creates a true cinematic "feel." Just don't watch it on a 13" set. . . .

Lucas had wanted to make *Flash Gordon*, but the cost of the rights were prohibitive. Instead, he used his own fantasies and characters and, helped by Joseph Campbell's *The Hero with a Thousand Faces*, Lucas created what *SF Film Encyclopedia* editor Phil Hardy has called, "A myth for our time." Said

(Continued on page 98)

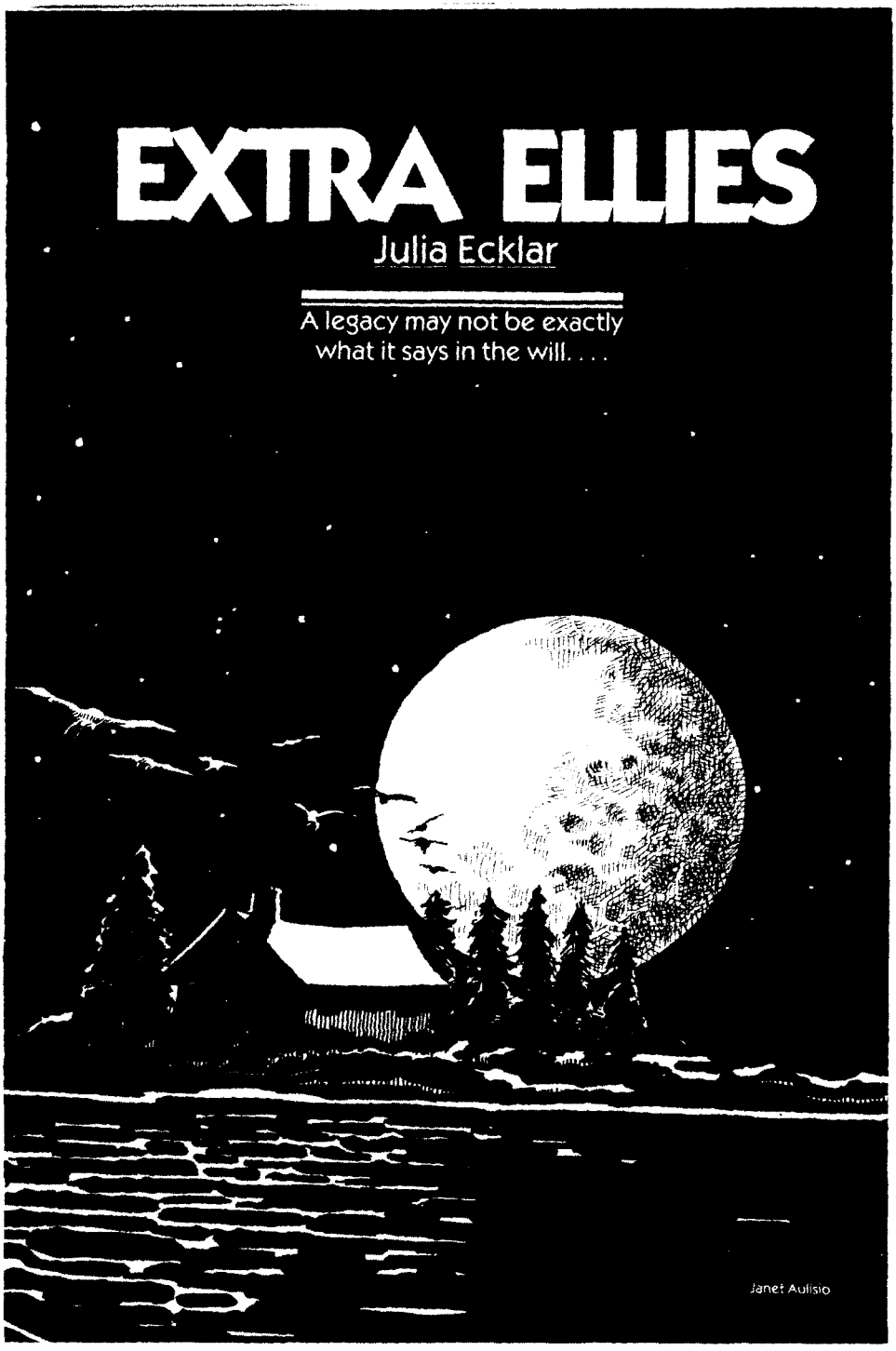
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

EXTRA ELLIES

Julia Ecklar

A legacy may not be exactly what it says in the will. . . .



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Ina Kohill manually landed her mover where the transit tube widened at late Uncle Trenner's private node. She winced as the mover's underbelly bumped onto brushed metal, counted the requisite three seconds to make sure she'd accomplished full landing, then edged a trembling hand up to shut down the engine.

Negative 24 seconds, her brain calculated—out of habit, not because she really wanted to know. *Per manually-driven kilometer.*

Ina closed her eyes and tried to steady her ragged breathing. *God,* but she hated to drive!

And yet I sacrificed nearly ten minutes of my life to get here. Whistling for her luggage to follow, she vacated the silent mover. Those negative ten minutes were her own fault, she admitted. She'd been so unnerved by the prospect of leaving her safe inner-Station apartment, she'd forgotten to download the day's construction detours into her mover's memory. So when they came upon a tunnel shut down for routine maintenance, the mover simply dropped into manual and let Ina steer from there. It was either steer, or sit forever at risk of being struck from behind by some other mover. So she accepted control. After years of trusting the mover to thread the transit webs on its own, Ina had forgotten what it was like to spend a whole trip worrying she'd run out of life and drop dead before reaching her goal.

Another few kilometers with the manual-driving deduction, and I might have! Her co-workers were right: every activity on the Station was just too expensive these days.

Beyond the bulkhead to Uncle Trenner's node rose a rough, ugly construction such as few Station residents could ever afford —life- or finance-wise. An ancient stone and glass mansion—no doubt transported up from Earth one filthy rock at a time—made inefficient use of the Station space Uncle Trenner had certainly paid a huge premium to obtain. A front walk, smooth and well-tended, crossed real grass under an artificial evening sun; green rolled away into pale azure on all sides, lending the illusion of distance to the self-contained node. Only the bushes flanking the porch steps—trimmed to a soft and harmless state—reminded Ina of the way sane people on the Station lived: frugal, protected, aware. She mounted the marble steps with precise, tentative lifts of her legs—

(negative 9.34 seconds)

—then waited on the porch for her luggage to catch up.

"Ina Kohill?" A voice both warm and mechanized sounded from beyond the elaborate door.

"Yes." Her voice was much more stiff and strained than she liked to believe it could be. "I'm here for tomorrow's reading of Trenner Oslow's will."

"Of course." The gentle whir of servos and drive wheels prefaced the door's inward swing. "Please, come in."

One step. Two. Her luggage scooted in behind her, the door whispered closed, and Ina uttered a silent yet near-explosive sigh. Inside, away from the strange dangers of someone else's node. As

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

close to home as she could get while half-a-Station away.

(positive 37 seconds, per day)

Ina felt every crimp in her stomach start to ease.

"May I take your bag, madam?" She recognized the smooth voice as the one which had greeted her just before the slim, urbane robot glided into her vision.

(negative .02 seconds, per day!)

Driving, steps, robots! "*The more moving parts in a system, the greater the capacity for harm.*" Ina glanced down and caught sight of her own reflection—round and almond-eyed—in the robot's polished breastplate. Her thinned lips and frightened eyes embarrassed her. *I wonder if robots sense fear?* A little smile surfaced with that thought, helping her to relax her expression.

"Did you . . . " Noting that the robot hadn't moved, she relinquished her bag with a clumsy staccato whistle. "Did you belong to Uncle Trenner?" she finally managed. Uncle Trenner was a sport, after all. Sports got to work on faster-than-light ships, which meant they lived what seemed like forever and made an unwarranted amount of money. That's why they could afford things like real grass and antique houses.

The robot's liquid crystal smile settled into a pleasing, simplified curve. "No, madam. I was your Uncle Trenner's employee. My name is Jeeves."

Employee. Name. A Newborn, then—declared sentient by the courts, capable of independent thought and judgment, and infinitely safer than a mere robot.

(positive one minute fifteen seconds, per day)

"If you'll follow me . . . " Jeeves swiveled at the waist and rolled toward one of the many archways leading off the foyer, taking Ina's luggage with him. Afraid to be left alone without a guide, Ina hurried after. "Perhaps you'd like to survey what you'll inherit from your uncle?"

Not really, but she didn't say so. Everything in the inheritance was already destined to be sold. Ina didn't need a module with stairs and wood floors, or a long drive into Station Central every day, or a Newborn in a stylized tuxedo. She needed money. The admission felt weak and dirty, but it was true nonetheless. For the past six years she'd worked for Health and Safety, making barely money enough to survive; the stress of poverty had already shaved 1.2 years off her life expectancy, and the tally swelled each time she counted her change before buying lunch.

Even her neighbor had somehow managed to accrue more than positive 150 years. The other tenants had gasped with delicious fear when Zanos—fluttering his hands and smiling nervously—announced that he planned to risk his ellies by weekending on Daedalus. Ina couldn't help feeling that it didn't deplete the danger just because he reduced his life expectancy to chic catch phrases (of which "ellies" had to be the most inane). Still, she envied him the option of wasting extra ellies; she often fantasized about taking such a chance.

This inheritance could effectively buy back whatever ellies she lost by coming and staying here, and might even give

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

her the chance to outstrip her co-workers for once. She hadn't counted on the tunnel maintenance, however. Or the steps.

Or the swimming pool.

Ina hadn't realized it was chlorine she smelled until Jeeves ducked out of sight through a dimly blue-lit doorway. She followed him, blindly confident this sentient machine would protect her—then nearly cried out when she rounded the corner to be met by a glossy expanse of brilliant aqua water. Her hands flew to her mouth before she could think to repress the gesture.

(negative 1.46 years per 100 gallons of water—length: 20, 25 meters, width: 30, 35 meters, depth: oh god oh god oh god!)

"This was your uncle's favorite part of his home," Jeeves confided, completely oblivious to the wild rat of panic racing about in her brain. "He spent much of his station-bound time here."

(if I walk in my sleep—do I walk in my sleep?—another negative .66—)

"Madam, is something wrong?"

Ina could almost hear connections ripping as she pulled away from her calculations; they continued without her, building tessellations of fear. "I . . . " Her voice squeaked like fingers against glass. She cleared her throat and tried again. "No one said anything about a swimming pool."

Jeeves's face realigned into a countenance designed to express concern. "Oh, goodness, no—I hadn't thought. You don't swim?"

She shook her head. Who did?

"Would it help, then, if we went straight upstairs and got you settled?"

Ina nodded shortly, already sidling toward the door without a care for whether Jeeves accompanied her. She was afraid to take her eyes off the pool; her feet might betray her, slip on the pebbled pool-side surface and fling her to her death.

Once in the doorway, she craned a guilty peek back over her shoulder. She'd never seen so much water all in one place, not when it was such a rare commodity. She couldn't help wondering what that much cool liquid would feel like against her skin.

At that thought, she flushed with horror at the temptation, jerking away from the doorway to follow Jeeves toward the huge, spiral stairway. *Is it worth this? Is money worth thinking things like this?*

(financial stability: positive twelve years per one for an expected 94.29 years nets a base return of 1131.48 years)

Barely enough to counteract the swimming pool.

"Your uncle said you worked for Station Central." Jeeves, the flawlessly perfect butler, evinced the same calm politeness as when Ina first walked through the door. "What position do you hold?"

"I'm a risk evaluator for Health and Safety." She gripped the handrail tighter as they swept around the first bend. "I calculate the effects of everyday hazards on average life expectancies."

"Ah." Jeeves gained the second floor and started off down the hall. "How very challenging."

The swimming pool kept Ina awake all night.

She didn't believe it was going to come after her up those horrible steps or anything (she wasn't quite *that* silly),

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

but chlorine buzzed in her nose even where she burrowed under blankets in a Deck Two bedroom, and the slapping of water against stone startled her into a sitting position more than once. Part of her was sure she'd imagined it; another part dwelt on the better than 150,000 gallons of water below, and thus kept the first part awake.

Jeeves apparently sensed this during his inspection of the sleeping rooms; light from the hallway glinted off his angular shoulders as he keyed open Ina's door. "Trouble sleeping, madam?"

Ina rolled onto her back, sighing with embarrassment for having been so startled by his arrival. "I could ask you the same, Jeeves."

"Madam, Newborns do not sleep." The indignation in his statement made Ina smile. "Perhaps I can bring you something from the pharmacy?"

Bad enough that Jeeves expected her to want to sleep away from the spartan safety of her own abode; the thought of taking medicine not dispensed by her own medic made her shudder. "No, thank you, Jeeves," she replied, studying the ceiling above her. "I'll be all right. You can go back to . . . to whatever Newborns do."

Jeeves didn't abandon the open doorway, however. Just before Ina would have glanced over to request he leave, he asked quietly, "Is it the swimming pool, madam?"

Nascent lies were swept away by the coldness that raced up through her. "Yes, Jeeves. It's the swimming pool."

"If I had known it would bother you, I could have had it drained."

"No, I . . . " She rolled over to face him again, hugging her pillow under her chest like a drowning man might hug a life preserver. "You lose nearly 1,000 years of life expectancy every time you have an encounter with a swimming pool. Did you know that? And yet Uncle Trenner went to all the effort just to put one in his module! *Why?* Did he hate all his friends? Did he hate himself so much that he wanted to die so early?"

A fine little symphony of servos answered when Jeeves cocked his head to one side. "No, madam," he said very gently, "your uncle didn't hate himself. In fact, he loved himself very much. That pool was his special gift to himself—the closest man can come to zero-gee while in a gravity well, he always said. He was born and grew up Earthside, and he often spun tales of summers spent swimming in the lake near his parents' home. Always full of algae and sea gulls, he told me. I believe he hoped you would love this pool for its memories of a world now gone."

Ina squeezed the pillow tighter. *Never!*

"Your uncle lived to be nearly one hundred," Jeeves added. As if that mattered.

"He wasn't really my uncle." Ina tried to find some solace in that knowledge—some consolation that, whatever idiosyncracies decorated her uncle's life as a sport, she didn't have to let them litter her own.

"I realize that," Jeeves admitted. "However, many relatives adopted the title 'uncle' in the wake of faster-than-light travel."

"I never even visited him."

Again the minute tilt of Jeeves's head. "He never invited you."

Ina wondered if that said something about Uncle Trenner, or about her.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Rolling over with a disgusted little snort, she tugged her covers up under her chin. "I'll be all right, I guess. You can come get me when it's morning."

Jeeves refused to take the hint. "Perhaps madam would like to go downstairs for something to eat?"

"No—" Ina began, but the Newborn persisted, "Warm milk would calm your stomach, madam. I could fetch some for you, if you'd like."

They probably program them for stubbornness. Then she wondered how much programming robots required once Newborn, and decided she'd no doubt lose this stand-off anyway. Tucking her dark hair behind her ears, she crawled out of bed in only her nightgown, not bothering to find a robe (Jeeves wasn't even human, after all). "No, that's all right—I'll go down by myself." Then added, because she thought it might please him, "I'd like to see if I can remember the way on my own."

"Very well, madam." Jeeves bowed out of the doorway and disappeared down the hall.

Of all the rooms shown her during Jeeves's tour of the monstrous house, Ina remembered the kitchen best: a huge, spacious affair—perhaps the safest room in the module. Almost everything was automated, well designed, protected. Even in the dark, it reminded her of the security she'd abandoned to come here, made her feel a little less homesick and frightened. As her toes sank into the shock-resistant carpet, she tried to remember if eating after midnight affected her ellies enough to worry about. If she had to think about it, it probably didn't; she tip-toed across the unlit kitchen to scrutinize the menu, all the while pretending the swimming pool wasn't waiting just a few rooms away.

Somewhere between warm milk and warm cereal, she heard a door whisper behind her. Ina's heart surged into her throat; she splayed her hand over the menu display in an attempt to hide the glowing letters from unwanted scrutiny.

Shadows flickered in the hallway, silent movement across a patch of yellowed light. Images of night-black burglars stampeded her brain, only to be crowded out by frantic computations regarding how much risk she suffered by facing prowlers in a strange node. Just that quickly, her logical mind saved her.

Servants, it told her with a sneer of disgust. *Uncle Trenner was rich—these are human servants, come to confer with Jeeves while I'm asleep. Uncle was a sport, and sports love stupid extravagances*. She wasn't at all certain what sort of things servants might discuss with Jeeves, but she was content to creep back to her bed without finding out.

A figure blacker than the other shadows materialized in front of her, barring her from the doorway. She gasped a tiny squeak of surprise, but a hand clamped over her mouth from behind before she could let loose a scream. A man's hard body pressed against her back, propelling her toward the figure in the door; digging her feet against the carpet burned her soles, but didn't halt her progress. The man in the doorway hissed. "Shhhhh!" in her ear, then took her arm to hurry them onward.

Through a corridor, into the living room. Ina bucked and kicked against them to no effect; they didn't even seem

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

concerned about her struggles or the noise. Where was Jeeves? she wondered wildly. Where were the security systems? The sirens? The authorities? As she realized they were pushing her toward the dim blue entry to the swimming area, her mind could only focus on the fact that there was something very, very wrong here.

(kidnapping: 90% galaxy-wide end in death; negative 2,734.67 years)

And she was suddenly certain she would die without ever understanding any of this.

The man behind her tightened his grip as she redoubled her efforts to escape. "Don't fight me, Ina! Do you know what this is?" He raised his hand to flash a dark metal cylinder in front of her face. A drug gun. Ina nodded stiffly.

"And do you know what this is?"

The first man, padding along beside them, snapped a drug dart in half between his fingers and waved it under her nose. An odor—sharp and chemical as burning metal—knifed into her sinuses in harmony with the hard pool smell as they pushed her through the door. Panicked, she tried to jerk away, hitting her head on the man behind her.

(swimming pool, second encounter: additional negative 1,127.382 years)

(terminal total)

(oh, god!)

"That's right," the prowler whispered, tightening his grip again. "Ansenol. The stuff they use to wipe a sport's memory when he's been bad. You don't want that to happen, now, do you?"

I'm not even a sport! she wanted to shout. Nothing came out but a thin, frightened moan. She only hoped they'd wipe her mind before the pool overwhelmed her completely. She was as good as dead already.

"So you're going to be real quiet for us, aren't you, Ina?"

She didn't see that she had any choice but to nod, not now that they all stood in the fragmented illumination from the swimming pool.

They pushed her back into the corner, away from the pool. The wall felt smooth and cool against her back as she slid into an awkward crouch on the pebbled floor. She could almost feel ellies bleeding away into the chill stones.

"You work for Health and Safety." Although both were swathed in black, the man who'd been behind her was stout and square, his voice keenly recognizable. He also held the gun. "You're in charge of the comps that run the numbers that tell everybody else what to do." He squatted in front of her, the gun resting lightly across one knee. "The safety statistics," he clarified.

"I don't even have the money yet." Ina heard her voice trickle out of her, as lifeless as the water before them. "There isn't anybody you can ransom me to. . . . " *Except a Newborn butler who doesn't really care.*

"We aren't kidnapping you," the taller of the pair, still standing, explained.

"We want you to change those figures."

Ina's fingers felt numb where they played against the rubbled floor. She looked from one man to the other. "What do you mean, 'change them'?"

"People on this Station run their lives according to Health and Safety's numbers," the second man continued. "We

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

want you to fudge them. Make things safe. So people will *do* things again.''

Amazing how fearless she could be now that she had nothing left to lose. ''I can't 'make things safe.' Things *are* what they *are*. Those numbers are real.''

''They aren't,'' he began, but she overspoke him: ''They *are!*''

''Ina, we didn't want to have to wipe you—''

''Deneb!''

She shot her attention back toward the man with the gun.

''—but you're really starting to piss me off,'' Deneb finished. She could see the barrel, pointed for her eyes. ''Are you gonna change the statistics for us, or not?''

''You shoot her,'' the second man snapped, ''and she's useless.''

''You had your chance, Reidle.''

''Nobody else can do what she can!''

Deneb cocked his head at Ina, looking more like a friend in an intimate discussion than a terrorist. ''Well?'' he asked her, ignoring Reidle.

''Stop it!'' Reidle insisted. He reached to deflect Deneb's gun with one hand.

Ina's brain leapt into life as Deneb turned to swear at his partner. She had no ellies worth dickering, but they hadn't actually killed her yet. Her chances of escaping—

(34.36% while in swimming area with them; 57.9% once through the doorway)

—were at least better than her chances if she stayed here.

(none)

She lashed out with her hand as hard as she ever had, smashing Deneb in the groin where he crouched ahead of her. He crumpled with a groan; catching the gun in both hands, she aimed it upward at Reidle—

''Ina! Wait!''

—and fired. He gasped as the dart hit him, but Ina didn't stay to watch the drug take affect. Shoving Deneb backward into the water, she scrambled to all fours, then upright as she tumbled out the door.

''*Jeeves!*'' Blood sang in her veins, adrenaline firing her nerves like the clear, bright ringing of bells. She bolted through the kitchen, down the narrow hall, skidding to a stop in the foyer when she saw the Newborn poised at the foot of the stairs. ''Jeeves! I've been calling! Where have you been?''

He angled his flat mechanical face up at her, as though surprised. Ina realized suddenly, *I ran through the house! Another hundred million ellies, down the drain*. The very thought nearly moved her to giggles.

''There are men in the house,'' she began, all out of breath.

''I know, madam.''

''They took me in to the swimming pool!''

''Oh, dear.'' Jeeves rolled past her, into the corridor. For no reason she understood, Ina found herself following.

''They wanted me to lie about the Health and Safety statistics!''

Jeeves turned smoothly in toward the living room; Ina hovered in the doorway when she heard voices—one calm, the other rough and angry—echoing in the next room. Jeeves rolled to a stop at the center of the room. ''Deneb? Reidle?''

Suddenly cold and dizzy, Ina clutched the doorposts with both hands.

''Are you gentlemen all right?''

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Both prowlers stumbled in from the swimming area—Deneb red-faced and soaking, Reidle bright and alert. The gun swung easily from the taller man's hand; he glanced across at Ina with an embarrassed little smile. "She's a bit stronger than you gave her credit for, Jeeves."

Ina swallowed hard against her confusion. "You knew . . . " she accused Jeeves in a tight and angry voice.

The robot hummed about, bobbing his head in contrition. "I'm afraid so, madam."

"You let them in! You were going to let them kill me!"

"Certainly not, madam!"

Reidle came forward two quick steps, offering the gun on one outstretched hand like a love gift. "I'm still standing, aren't I? If we really had ansenol in this thing, I couldn't be talking to you now. Isn't that right?"

It was. She knew it was. Her eyes flicked over to Deneb, dripping onto Uncle Trenner's expensive carpet. Even more so than the phantom ansenol, it amazed her to see Deneb alive.

"Those Health and Safety numbers are important, Ina." Reidle's voice washed in on her thoughts like fresh air. It didn't clean away the musty chlorine smell that Deneb carried on his clothing, though. "Everyone on this station uses the charts *you* compile to decide what to do, when to do, how to do. They count the minutes and seconds of their life expectancy like change."

"I can't lie about statistics," she heard herself retort. "People have a right to know."

"To know what?" She saw Deneb's mouth move and heard the words fall out, but still felt like she was facing a ghost. She pulled instinctively away when he stepped near. "Tonight, you thought we'd hurt you—you thought we were stealing *years* from your life. And putting them *where?* Are they back now that you know you're safe? Are you going to die a few days sooner because your statistics said you'd lost more years than you'd gained?"

"I . . . " Words occurred to her—words she knew she'd uttered some hundred times before—but they were suddenly pointless. She wasn't sure why.

"And I'll bet you expected me to die." That accusation stung like a needle. Deneb moved another step closer, his eyes passionate with frustration when Ina backed further away. "When you pushed me in the swimming pool, you thought it would kill me, didn't you?"

"Of course," she began haltingly. "The statistics—" *All that water, up over your head!*

"Statistics are meaningless," Jeeves interjected gently. "They are numbers, madam, nothing more."

"They measure man's fear," Deneb persisted, "not his life. A man's life consists of all the dangers he's ever been willing to face. Including learning to swim. Your Uncle Trenner understood that life is the one thing man has that can't be hoarded—you only gain more by spending what you've got."

Jeeves glided all the way up to her then, tilting up his programmed face in eloquent submission. "Madam, you hold the key to set these million people free. Don't forsake them, I implore you."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Ina looked down into his eyes, wishing she could see through them into whatever soul a Newborn possessed. "And all I have to do," she asked carefully, "is lie about those numbers?"

Jeeves nodded. "That is the beginning, madam. We all have our own roles to play."

She wanted to smile, but couldn't make her muscles obey. "Am I your role, Jeeves?"

Jeeves's liquid crystal mouth had no difficulty with the expression. "Yes, madam, you are."

She looked around at all their faces, wanting to find some special knowledge there. Nothing but hope and longing gazed back at her. Walking past Jeeves and between her erstwhile kidnappers, she crept up to the swimming pool's entrance as though stalking some fearful creation.

The air inside was moist and heavy, just like bathrooms must have been back when they still had showers. But showers were deadly now—the Health and Safety statistics said so. Ina allowed herself to see beauty in the warm blue water and the dancing white light; she had difficulty visualizing anything past the veil of her own fear.

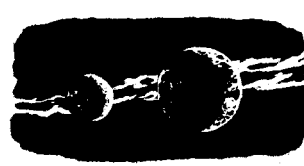
Someone stepped quietly up behind her; she knew it was Deneb by the wet squelching of his feet.

"You were right, you know," Ina admitted, still staring into the blue. Were lakes really this color, she wondered? Were oceans? "When I pushed you in, I really believed that meant you would die."

"Risk never killed anyone." He moved up behind her and closed his cold, wet hand about her own. "But stagnation is killing us all." Then he released her and moved a little closer to the pool.

Fear tried to strangle her as she inched up to his side. She placed one foot on the first step under the surface, willing her trembling legs to mince forward, one terrifying step at a time.

Water, gentle and welcoming, closed about her ankles, her calves, her thighs. Hugging her waist with the delicacy of a loving mother, it stroked her in tentative waves, as though afraid large movements would startle her. Ina clung to the pool's edge with both hands, shivering even though the water was warm. She tried to imagine water falling from the sky, or stones made smooth by eons and the ocean, not by a stone-cutter's machine. She tried to imagine that she understood whatever it was in Uncle Trenner that made him enjoy the feel of water against his skin. That made him miss a past where exchanging risk for reward didn't mean you were crazy. Then she closed her eyes and forgot all the numbers, and tried to imagine the cries of gulls in the distance, the warmth of a real summer sun on her face. ■



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Probability Zero

FITTING SUITS

Ben Bova

History, as we know, is sometimes made by the unlikeliest of persons. Take Carter C. Carter, for example. All he wanted was immortality. Instead he created paradise.

All of you are too young to remember the America of the late twentieth century, a democracy of the lawyers, by the lawyers, for the lawyers. It was impossible to sneeze in the privacy of your own home without someone suing you as a health menace. Inevitably the lawyers would also sue the home builder for failure to make the structure virus-proof. And the corporation that manufactured your air-conditioning system, wallpaper, carpeting, and facial tissues. To say nothing of the people who sold you your pet dog, cat and/or goldfish.

It got so bad that in 1988 a public servant resigned her sinecure because of a lawsuit. A social worker employed by a moderate-sized midwestern city was slapped with a personal liability suit for alleged failure to do her job properly. She had advised an unemployed teenaged mother to try to find a job to support herself, since her welfare benefits were running out. Instead, the teenager went to a lawyer and sued the social worker for failure to find her more money.

Rather than face a lawsuit that would have ruined her financially, whether she lost or won, the social worker resigned her position, left the state, and took up a new career. She entered law school. The teenager lived for years off the generous verdict awarded her by a jury of equally unemployed men and women.

This was the America in which Carter C. Carter lived. We have much to thank him for.

He was, of course, totally unaware that he would change the course of history. He had no interest even in the juridical malaise of his time. All he wanted to do was to avoid dying.

Carter C. Carter had an inoperable case of cancer. "The Big C," it was called in those days. So he turned to another "C," cryonics, as a way to avoid permanent death. When declared clinically dead by a complaisant doctor

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

(a close friend since childhood) Carter C. Carter had himself immersed in a canister of liquid nitrogen to await the happy day when medical science could revive him, cure him, and set him out in society once more, healthily alive.

He left his life savings, a meager $100,000 (it was worth more in those days) in a trust fund to provide for his maintenance while frozen. It would also provide a nest egg once he was awakened. He was banking heavily on compound interest.

His insurance company, however, refused to pay off on his policy, on the grounds that Carter was not finally dead. Mrs. Carter, whose sole inheritance from her husband was his $500,000 life insurance policy, promptly sued the insurance company. The insurance company's lawyers, in turn, sued the Carter estate on the grounds that he was trying to cheat, not death, but the insurance company.

After several years of legal maneuvering the suit came to court. It was decided in favor of the insurance company. Mrs. Carter promptly sued the judge and each individual member of the jury for personal liability on the grounds that they had "willfully, deliberately, denied her her legal rights." And caused her intense pain and suffering while doing so.

The judge, near retirement age, had a vision of his pension being eaten up by legal proceedings. He quit the bench and signed a public apology to Mrs. Carter in return for her dropping the suit against him. The jurors, none of them wealthy, quickly settled out of court. The insurance company did likewise, in advance of having their entire board of directors sued.

Mrs. Carter's lawyers, unsatisfied with their share of the loot, looked for bigger game. Fueled by Carter's modest nest egg (Mrs. C would not let them touch her own money), they began suing members of the National Institutes of Health and the Justice Department, on the grounds that they had failed to provide proper medical and legal grounds for judging the rights of the cryonically undead.

A new fad erupted. Suddenly taxpayers were suing local bureaucrats for personal liability over failure to fix potholes in their streets. In one state the governor and entire legislature were sued for raising taxes to cover a budget imbalance. In another, the state environmental protection agency was sued for failure to regulate the pollution emissions of diesel trucks. The Secretary of Defense was sued simultaneously for invading Mexico and for failure to conquer Mexico. Politicians everywhere were sued for not fulfilling their campaign promises.

Bureaucrats resigned or retired rather than spend the rest of their lives and fortunes in court. Politicians thought twice, thrice, and even more about promises they had no intention of keeping.

A crisis struck the civil service at local, state, and federal levels. Faced with the threat of personal liability suits over alleged failures to perform their jobs, government employees were quitting

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

those jobs faster than they could be replaced. It did not really matter if they won or lost their suits, the time and cost of defending themselves were more than they could bear.

Several states tried to pass laws exempting civil servants from personal liability suits. Each legislator proposing or supporting such a law was sued black and blue. The idea died long before it reached the Supreme Court—which was down to five members at the time, since four justices had hastily retired.

Faced with empty desks and unfilled job openings, government departments reluctantly turned to computers to fill the roles that human bureaucrats had abandoned. "At least they can't sue a computer," said one department head, wise in the ways of bureaucracies.

To everyone's surprise, the computers worked better than the humans they replaced. Thanks to their programming, they were industrious, unfailingly polite, and blindingly fast. And much cheaper than people. They worked all hours of the night and day, even weekends. They never took coffee breaks or asked for raises. They transferred information with electrical alacrity, and eventually with the speed of light, when photonics began to replace electronics.

Computers' programs could easily be changed to accommodate new facts, something that had been impossible with human bureaucrats.

Taxpayers *liked* the computers. The usual gloom and oppressive atmosphere of government offices was replaced by bright humming efficiency. Citizens could even handle most problems from their homes, with their personal computers talking to the government's computers to settle problems swiftly and neatly.

In the meantime, with fewer and fewer liability suits to sustain them, lawyers began to sue one another in a frenzy that eventually came to be called "the time of great dying." Within a century the last lawyer in the US was replaced by a computer and sent into a richly deserved retirement in Death Valley.

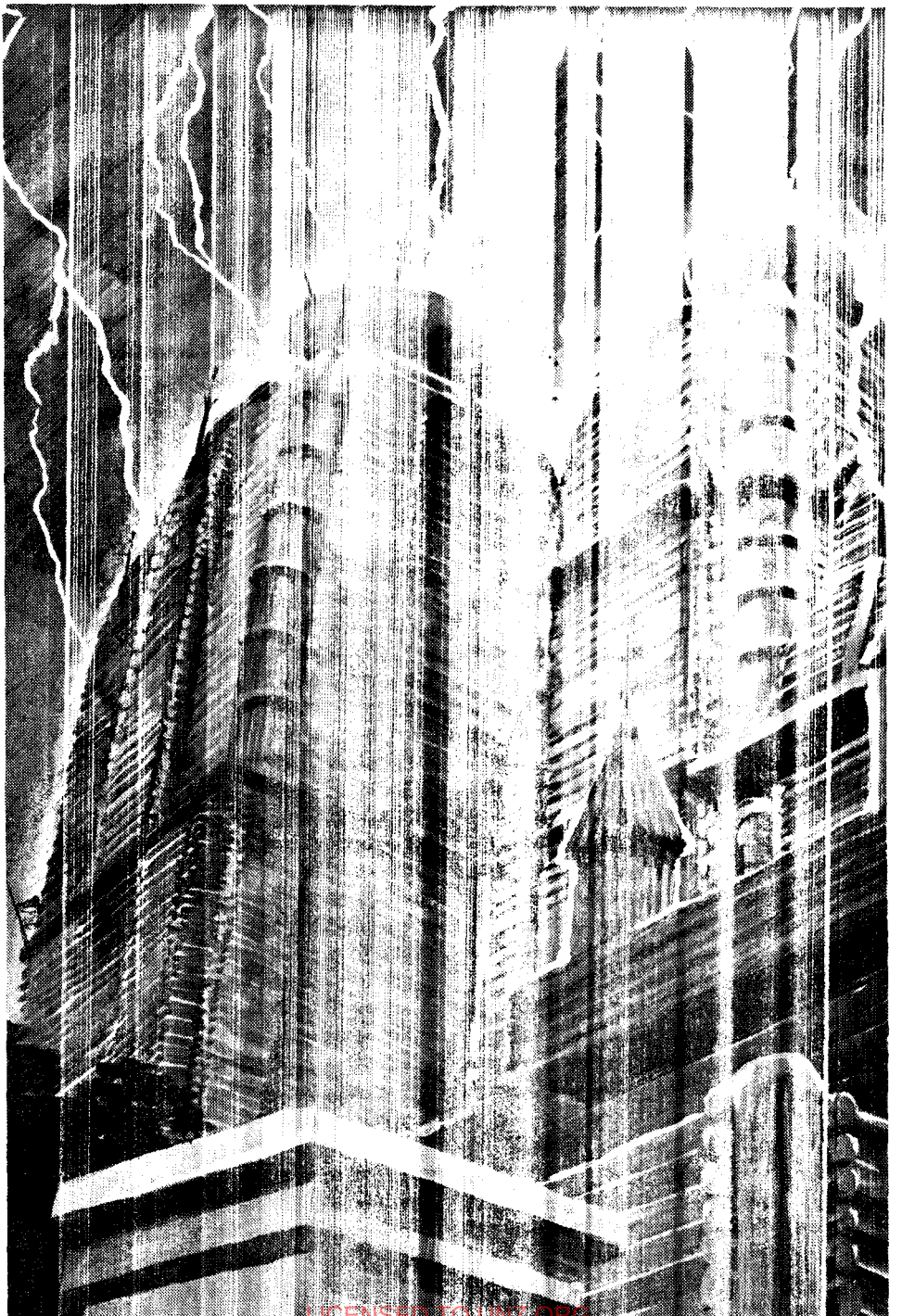
By the time Carter C. Carter was finally revived from his cryonic sleep, decision-making computers had replaced humans at all levels of government except the very top posts, where policy was decided by elected officials. All permanent government "employees" had electrons and/or photons flowing through them instead of blood.

Carter, however, was dismayed to learn that his modest nest egg had long since been devoured by rapacious lawyers, and that—thanks to compound interest—he *owed* the estates of his erstwhile legal representatives a total of some six million dollars.

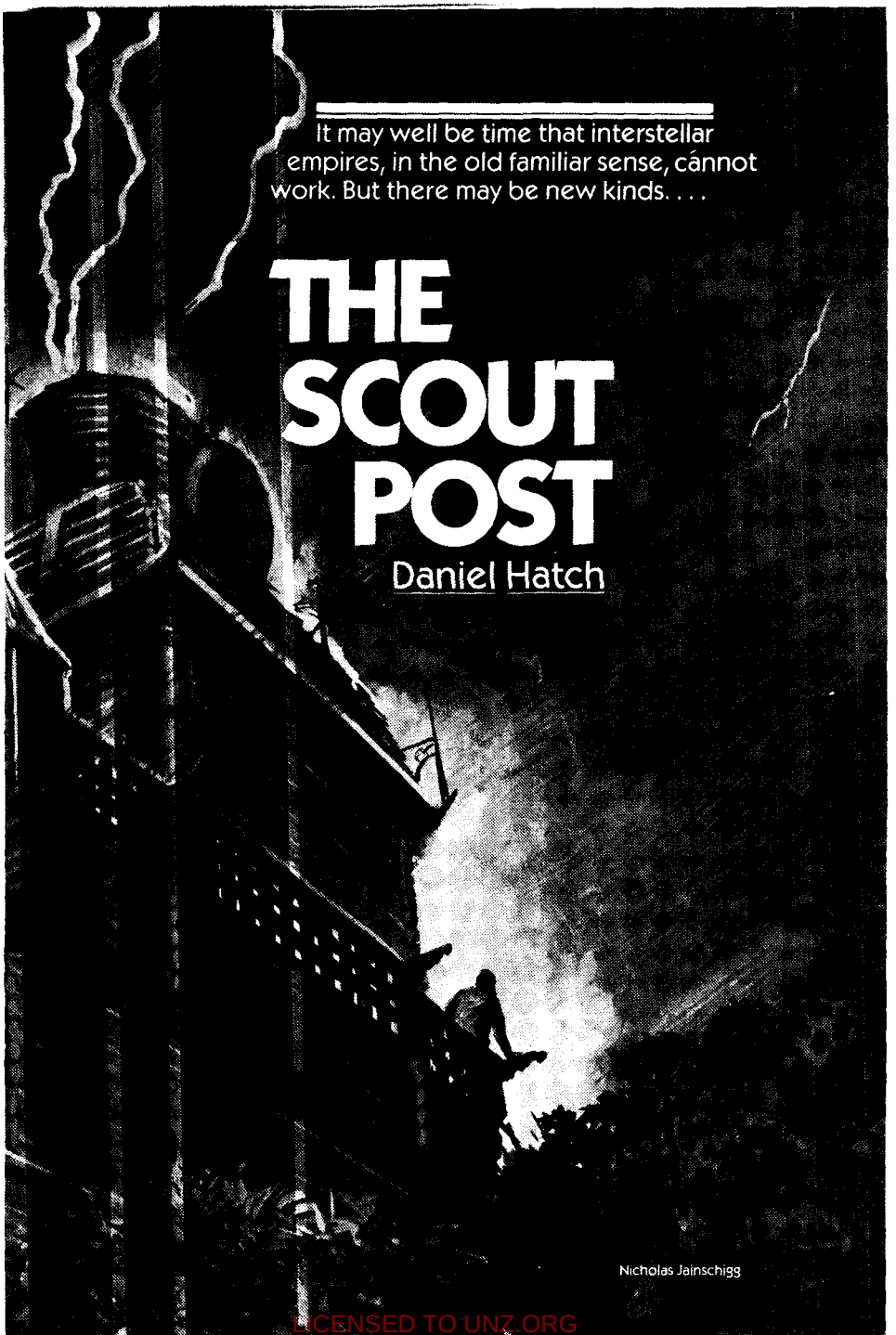
The shock stopped his heart. Since he had not had time to make out a new will, he was declared finally dead and cremated.

But his memory lives on. The happy and efficient society in which we live, unthreatened by the personal liability suits that ruined many an earlier life, is directly attributable to that unlikely hero of heroes, Carter C. Carter. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNL ORG
ELECTRONIC REPRODUCTION PROHIBITED


It may well be time that interstellar empires, in the old familiar sense, cannot work. But there may be new kinds. . . .
THE SCOUT POST
Daniel Hatch
Nicholas Jainschigg

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Pericles was a heavy planet. Too heavy. A buck and quarter is more gravity than I like to carry around, and I was trying to stay off my feet as much as possible.

So I was sitting on a stone bench beneath two tall trees—a Douglas fir imported from Earth two centuries ago and a native fern tree—waiting for my uncle to return.

The foothills of the Olympian Mountains descended before me to meet the Atlantean Sea in the west at Attica City. Behind me, nestled in the woods, was a small cluster of log cabins—Scout Post #21. Built by the scouts when they were still the only ones on the planet, it now belonged to my family.

From where I sat I could see thunderstorm cells bulking up towards the south.

With Pericles's heavier gravity and denser air, the storm had a compressed, furious look that I didn't like. Where I grew up, under Mu Cass on Asgard, weather was more majestic. Thunderheads piled miles high, with white anvils whipped back at the top by icy winds from mile-high glaciers, and lightning fell in great bolts that echoed with cannonades of thunder.

The clouds here looked like herds of wild vishnu stampeding across a darkening sky, and the lightning sizzled and hissed in long red arcs. They tell me that's because of the neon in the air.

I spotted the air car skirting the edge of the clouds as it circled around the hill towards the Post. It was about time Uncle Kurt got back from the city. Kurt was not my favorite relative, and I was hardly ever excited to see him. But this time was an exception.

He had gone into Attica City to pick up a political offender.

And I'd spent the whole day burning to know the answer to one question—what kind of a political offense would draw the interest of den Kolberg.

Den Kolberg is a commercial empire, not a political one. We own things, we make money and we run our enterprises, but from what I had seen in my few bioyears with my family, we didn't indulge in politics. We didn't need to.

I had grown up apart from the rest of the den—either through luck or through some unconscious design on my mother's part. I lean towards the former over the latter. Instead of being corrupted by my family's influence, I'd spent my younger years at Windsor Academy on Asgard.

The Academy was a sheltered environment—more so even than the tightly ordered societies of the Perseus Sector. For most of my youth, I managed to avoid all the trappings and celebrity of the Kolberg den. It wasn't until my last couple of years of school that I realized quite what it meant to belong to my family.

And when I found out, I wasn't quite sure that I wanted to.

Uncle Kurt was part of the reason why.

These days, Pericles was a hard-working world of about 49 million souls, spread across nine continents and separated by six oceans. In the 200 or so years since the breakthrough colony had first landed, Pericleans had managed to build up a bustling little economy. In the past generation, the place

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

had begun the shift from an agricultural world to an industrial one—with all the benefits and detriments that accompanied industrialization.

The transition meant the kind of extra attention that only someone like Uncle Kurt could provide.

With the spacefaring schedule the members of den Kolberg keep, there are never more than a couple dozen of us on any of the colony worlds at a time. Some of my relatives don't like the tedious work of managing the empire and are content to exploit their position for a few years before moving on. Others are anxious to help, but inept at business. Then there are a few like Uncle Kurt.

Most of them are descended from the original Kolberg stock and a few of the hardier families that formed the den with them more than 250 years ago. They know where the family's interests lie and how to protect them. And they know how to get things done.

Kurt was from the Argentine branch of the clan, a brooding, oppressive man who was taken by wild swings of mood—likely to lash out in public or in private for any offense, real or imagined.

I was still trying to find my place in den Kolberg and they were still trying to find a place for me. Giving me a role model like Kurt did not reassure me about what they had in mind. In fact, I was beginning to understand that it wasn't up to me to find a place in the family. It would be up to them to find one for me—and then put me there.

That was a somewhat alien concept to me. At Windsor, we were always taught just the opposite—a man lives for his own ends unless called upon by duty, honor or humanity. The elders of den Kolberg believed that we existed to serve the ends of the den—first, last and always. Uncle Kurt seldom let me forget that.

The memory of him that has stuck with me the longest is of a meeting with the Planetary Transportation Commission.

We wanted to put a deep water port in near one of the den Kolberg landholdings with large reserves of metal ore. By the time the port was completed, that ore would be badly needed by the factories we were planning in Attica. The whole program wouldn't come together for twenty or thirty years—just a brief moment for the den, but far over the planning horizon for planet-bound administrators.

Uncle Kurt didn't want to leave Perieles without a commitment from the commission that the port would be built. Watching him convince them was a rare experience.

He pleaded, complained, bullied and cajoled. The fact that den Kolberg already controlled a majority of the seats on the commission was irrelevant to his task. He insulted each of the commissioners in turn until, by sheer weight of fire, he defeated any arguments they could have posed.

And then, after he had wrestled every last concession from them that he could, he turned around and insulted them for their weakness in being unable to deny him anything.

"You may hate me," he crowed at them, "but your grandchildren will be glad I was here to make sure you did what was necessary. And your great-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

grandchildren will meet me at the spaceport with flowers and banners to honor me for my foresight, while cowards like you won't even be a footnote in the history books."

I have no doubt that he'd made the same speech to their grandfathers—he made it often enough to the current generation of leaders.

When he was alone with me, he would break down in tears and profess his love for the people of Pericles, despite their unworthiness and their betrayal of his devotion. He said he admired their physical strength more than anything, but he was convinced they lacked the moral strength that had to go with it—moral strength that only den Kolberg could supply.

He blamed that on the fact that no one from den Kolberg had been on Pericles for more than fifty years before Kurt's return. The Grand Reunion, celebrating the 250th anniversary of the creation of den Kolberg, had drawn us all back to Eta Cass.

It was twenty-five years there and twenty-five back. We kept in touch with Pericles and our other worlds by the laserline, but there wasn't much we could do to control things. All our instructions would have arrived at the same time we did. In the event, Kurt insisted, it meant that Pericles had been allowed to wander on its own for far too long, which had weakened its moral fiber.

After watching him go through his cycle of recrimination, rejection and confession several times, I had become convinced that each phase was an act, a performance for whatever audience he was appearing before. There was no soul behind any of the various postures, no human feeling motivating the words.

The rest of my family is somewhat more restrained. But a good portion of them—including my mother—could easily turn into an Uncle Kurt under the right circumstances.

I rose to my feet cautiously. A heavy-gravity field can be tricky if you don't watch yourself and it hurts more when you fall. You don't just weigh more, things fall faster. Like your feet—and your head. I had learned that the hard way.

As I labored past the buildings and grounds of the post I noticed the thick signs of age that cloaked them. Moss and vines clutched at the foundations and coated the rooftops. Flyers and chitinoids had made their nests in the woodwork. The paint on all but the main building, where we'd done some renovation, was faded and cracked. Although I'm sure they had a few decades on me, I don't think they were as old as my father.

The notched-log construction of the great lodge showed the painstaking style of the early scouts, but the thick beams sagged from three centuries of bearing their burdens—fern trees did not make good lumber.

The roof and eaves sprouted a forest of ornate iron spikes from every corner and peak. Loose copper wire connected them to the ground to form an array of lightning rods meant to deter the fiercest storm. I wondered with a shudder just how effective they were in practice.

I took the steps slowly, always surprised by the suddenness with which my

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

feet dropped to the ground, and stepped inside.

My uncle sat on a couch inside the main lodge, illuminated by the low skylight in the cupola above. Standing watchfully around the perimeter of the large circular room were half a dozen den Kolberg livery, dressed in brown and yellow uniforms with our family crest pasted on their chests.

The political offender sat at one of the tables that circled the inner portion of the lodge.

He looked fit. No one had beaten him or drugged him, from what I could see. I thought he looked a little pale, though, and his breathing was fast and shallow. He was probably scared. I knew I would be.

"Alex, this is Thomas Haynes. He is an astronomer," my uncle said. "Mr. Haynes, this is my nephew Alexander Brockwell Kolberg den Kolberg. He is a space pilot. You should get along well together."

Haynes looked at me. He couldn't have been much older than I was in bioyears, but I'm sure I had at least a century on him in realtime.

Uncle Kurt rose and strode across the room to the door with slow, measured steps. He'd had a lot more practice at it than I had.

"Alex, I must return to the city to take care of some business before we leave. You will keep an eye on Mr. Haynes while I'm gone."

"Yes, sir," I said smartly, clicking my heels as I snapped to attention, showing off my academy training. I knew that irritated him.

"When I return, all three of us will depart together for Delta Trianguli."

I heard Haynes sigh and saw his shoulders sag as the breath went out of him. He seemed more surprised than I was—and a lot less happy.

In humanity's great push into interstellar space, the Scout Service had been the trail-blazers and the explorers. On each of the dozens of human-settled worlds within fifty years of Earth, the scouts had gone first—testing the atmosphere, the soil and the oceans, gathering data from far-flung islands and continents, mapping resources and life forms, searching for the sites of future cities.

The Scout teams—usually no more than a couple hundred families—were the only human settlers on the planet for decades, while the huge breakthrough colonies were assembled and shipped the long years out from Earth.

Here at Theta Persei, more than 40 years from Sol, the Scouts had been part masters and part caretakers of an entire planet for nearly a century. They were still around, still exploring the wide reaches of Pericles, but not in this part of the world. They'd left Post #21 long ago and my family bought it as a resort. Outside of the stormy season, it was a perfect place to retreat from the high-pressure environment of den Kolberg business affairs—or to hold the occasional political prisoner.

"You know," Haynes said, "I thought you were only going to skim me along six months and screw up my life a little bit, but I guess I underestimated you. How far is Delta Tri from here anyway?"

"Fourteen years."

"Banker's years or planter's years?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Banker's years."

"That's a relief." I'm sure it was. On Pericles, a planter's year—the annual turn of the season—is more than twice as long as the banker's year of old Earth. "That means my little girl will be thirty before I can get back here, doesn't it? Thanks a lot."

"That's about right, if she's two years old now. I thought my uncle said you were an astronomer."

"No, that was just his little joke," he said.

I'd seen some of the file we had collected on Haynes. Uncle Kurt had left it on the screen the previous night while telling me about his appointment in Attica.

He was a graduate student in economics at Attica City University who'd attracted Kurt's attention a year or so back in realtime when he transferred out of Kolberg University without notice. Our network of spies and informers told us he was being openly critical of the family—and for someone who could end up in a teaching position some day, that warranted further attention. After our last six-month skim, Kurt threw a fit upon receiving a message from our informers—he was in too much of a rage to be very informative. But it was enough to get my sensors up and probing.

Unfortunately, the file on the screen last night did not reveal the one thing that really mattered—the nature of his political offense.

And I was aching even worse to find out now that I knew we were taking him to Delta Tri—outside the den Kolberg worlds. Delta Tri is an independent star system perched between the Perseus and Eridani sectors with connections to both but allegiance to neither. Zoroaster, the major planet in the system, was a cash-and-carry society without a complex finance-driven economy. It was the perfect place to send a political exile. If Uncle Kurt was taking Haynes there, he must have done something horrendous.

But what?

Most of the worlds of the Perseus Sector had been agricultural societies for the past two centuries—heavy on local politics, but uninterested in planetary or interplanetary affairs. Industrialization had forced the creation of stronger political organizations on the older worlds at Eta and Mu Cass, but they were never a threat to us. Tikarahisat and Asgard had been ours down to the soul from their earliest beginnings.

I knew we had to be busy behind the scenes to keep things that way, but just what were we doing? And what were the political offenders doing that we didn't like?

No one had answered those questions for me.

At the business institute back on Tik, where I'd spent a year learning how the den Kolberg commercial organization works, the instructors were less than forthright. I kept asking questions about political influence, but they would always avoid them. Then one day, one of the younger instructors took me aside and told me if I really wanted to know the answers to my questions, I should ask one of my uncles. That kind of thing was strictly for family members— and he was just part of the paid staff.

But I was reluctant to approach Uncle Kurt for anything but official business.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

He was the kind who would let you know if you had any questions and provide you with the answers he wanted you to have. So I just nurtured my ignorance instead.

I was hoping that ignorance would end this evening.

"What did your uncle tell you about me?" Haynes asked.

"All he said was that he had to pick up a dangerous political offender before we made space," I said. "I guess he's had his eye on you for a while. I thought we were just going to skim you along, too, if it's any consolation."

Skimming was a nasty thing to do to someone—taking them a few months out of the system and then bringing them back. At the institute, it was the kind of thing you talked a lot about doing to business rivals and obstructionist government officials. Usually we only talked about it. Displacing someone by six months can send them a pretty effective message, though. It makes a cosmic mess of their personal lives and usually takes the fight out of them.

If we were going to transport this guy out of the system entirely, though, he must have caused some serious trouble. Serious enough that Kurt didn't want him around to continue it six months down the line.

"Actually, this is a surprise to me. I thought we were going to be around here for another few months of real-time," I said. "What did you do to get Uncle Kurt that mad?"

"I guess I shot my mouth off once too often in the wrong places," Haynes said. "Or else your family has the whole world wired up like Big Brother."

"Like who?"

"Sorry, I guess that's a forbidden reference."

"Look, I don't care if you planned to blow up the Kolberg Tower in downtown Attica in broad daylight," I said. "My uncle gets real worried about politics, but I don't. To tell you the truth, there have been times when I've felt like blowing up the tower myself. And there are things I could tell you about my family that would make your hair stand on end."

"I'll bet you could," he said. "Actually what probably got me in trouble was my library card. I'll bet your uncle hit the roof when he saw what I'd been looking up."

"You're a researcher, aren't you?"

"I guess you could say that. And an astronomer. And even a dangerous political prisoner. So now you're going to ship me fourteen years away from here. Why not? You do it all the time. It's no big deal to you. But then, you probably don't leave your wife and kid behind when you do it, do you?"

He was in pain, and I could understand his bitterness, but I felt I couldn't let the opening pass. There was more to den Kolberg family life than he realized. Bitterness and betrayal were not something we reserved for outsiders. We dished it out without preference to whoever happened to be around. I turned his accusation around on him.

"No," I said. "My experience has been just the opposite. I was left behind while my mother shipped out."

"What do you mean?" he asked, suddenly attentive.

"When I was four years old biotime, my mother dropped me off at a military school on Asgard and flew home to Eta

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Cass. My father didn't show up for twelve years—realtime. We have our problems too, you know."

"Ouch. I guess you do," he said, his hard face softening just a bit. "I guess I had that one coming. Don't mind me, I'm just working off nervous energy. This isn't something that happens to me every day. A few hours ago, I was sitting in my office at the university, minding my own business, then all of a sudden your goons came in and grabbed me. This is the first chance I've had to stop cowering. I'll bet it's really going to start hurting in a couple of days—when it finally sinks in. But by then it'll be too late, won't it?"

"We call them the janitors," I said.

"What?"

"Our goons," I said. "My cousins and I call them the janitors. It's the uniform—the colors are the same."

"That's a good one," Haynes said. "I'll have to remember that."

"You still haven't told me what you did to get in political trouble with my family."

"That's because I don't know if I can trust you yet. How do I know you're not just trying to pump me for more information—or even a confession?"

"I guess you don't. I suppose I wouldn't be very trusting if our positions were reversed."

"Are they going to mind if I stand up and walk around?" he asked, pointing at the guards.

"Not if I tell them it's OK."

He stood up and stretched and I signalled the guards to keep their places around the lodge. Haynes was a native to the heavy planet and his compact body rippled with muscles. He walked with quick, slapping steps, snapping his arms and wrists nervously as he paced.

He looked strong and quick and, for the moment, I was glad that the janitors were all Pericleans as well.

I offered Haynes a beer and took a seat on the couch. One of the athletes in uniform brought us two mugs full with the heads slopping onto the wooden floor. He had Haynes sit down before he came within three meters of us, then left the mugs on the table. He was being extra careful.

The lodge was decorated with the paraphernalia of the early Scouts. A cabinet held a row of antique firearms—projectile throwers, gunpowder burners, electric needlers—none of which looked safe to use and all of them locked securely in the case. A rack on the wall contained a brace of long spears with wide, flat heads. Uncle Kurt told me they were protection against a local carnivore that used to rule the mountains before mankind took its place.

After a few minutes, it started to rain.

On Pericles, rain was similar to a needle shower at high pressure. The raindrops were tiny, hard beads of water and came down as if they'd been shot through a linear accelerator. The sound on the roof reminded me more of a live fire exercise at the range than the pitter-patter of pennies from heaven.

One of the guards built a fire in the stone hearth. He did a good job and it blazed up quickly. The flames were low and thick, but they gave off a good deal of heat. Instead of roaring from the logs, they erupted with a popping sound, then snapped upwards. On Pericles, even fire was different.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

With care, I shifted seats from the couch to an easy chair nearer the hearth. Haynes continued pacing in the center of the lodge for a few minutes, then came over and sat down in the chair across the fireplace from me.

"You must think life is pretty simple," he said, staring into the dancing flames. "You skip along from star to star. You manage your business. You set economic and social policy for a few years. Then you skip on out. No one sees you for a long time, but that's all right—because your investments keep on earning interest while the rest of us just stick around and work, work, work.

"And if you make the wrong decision before you leave, that's all right. One of your cousins will be along in five or ten years to change it. No one here on Pericles is capable of making decisions, of course, or questioning yours, or suggesting alternatives. Den Kolberg wouldn't like it, would they?"

"If you're trying to paint my family as a bunch of tyrants, you'll get no arguments from me," I said. "I told you before, I grew up in a military school at Mu Cass. I spent most of my life away from them and it's only been the last few bioyears that I've had anything to do with them. I'm just along for the ride while Uncle Kurt passes on a few tips on the art of business management. I knew that dealing with political problems was one of the things my kinsmen do, but they never explained just how."

"I wonder why?" Haynes said with sarcasm.

"I'll tell you why," I replied. "They don't even want to admit to themselves that they have political problems. Or any other problems. They like to believe that they are perfect examples of the human race and that their judgment is better than everyone else's and that the rest of you people should do what you are told because it's better for you than anything you can think of on your own. After all, we've been doing it for almost three hundred years."

Haynes leaned back in his seat and looked me up and down. For the first time since he arrived, I think I really had gotten his attention.

"You know, I've been saying exactly the same thing for months now," he said in a quieter voice than before. "So how come I'm being disappeared and you're not?"

"Because my family doesn't know about me yet," I said in a whisper. "They still think I'm one of them. And believe me, it isn't easy keeping up the act sometimes."

"But you're still going to help Uncle Kurt kidnap me," he said.

"Yes, I am. I'm sorry about it, but it doesn't matter how I feel. In the ultimate scheme of things, I'm afraid I'm not very important. I'm just here to drive the spaceship," I told him.

"Well don't put yourself out on my account," he said sullenly.

The room grew dark just then as the light faded from the front windows and the skylight. One of the guards went around the lodge and turned up the lanterns hanging from the rafters.

From the look of it, one of the storm cells had found us. A sudden flaring of red light in the distance, followed a short interval later by the tearing hiss of what passed for thunder confirmed my suspicions.

It didn't take long for the lightning

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

to build up to a nearly continuous series of flashes between sky and ground. The world was bathed in an orange-red glow and seemed to be filled with the hissing thunder, which sounded like a long line of rockets taking off for orbit.

Haynes drained the beer from his mug and stared into the fire with brooding eyes. I was still no closer to finding out the truth about his offense.

They talked a lot about honor at Windsor Academy. It was something we were supposed to learn outside the classrooms—out in the barracks, on the marching field, in the Great Hall of the Cadet Corps and in orbit aboard the old "Shanghai Maru" high above Asgard.

But the funny thing is that I was barely aware of it at the time. I didn't realize what I'd learned until I came in contact with my family. It was only their lack of honor that made me see how much a part of life at Windsor it had been.

I never could understand how my Uncle Kurt or my mother or the rest of them could lie to themselves so easily about the things they did. Honor always begins with being honest with yourself. When Uncle Kurt talked about moral strength, he was really talking bout honor—and in all the time I'd been with him, he never did or said anything to indicate that he was even remotely familiar with honor.

Despite all that, I realized that I didn't have much of an alternative to following Kurt's orders.

What could I do?

Help Haynes overpower the guards? I'd be a lot of help in a fight with those heavyweights. Given time to work out a plan and prepare it, maybe I could trick one or two of them into leaving the cabin, but then what?

Even if we could escape from the scout post, what would we do after that? I admire the scouts, but I didn't want to live like them. And how long would it be before Uncle Kurt got hold of some sensor equipment and hunted us down? If he didn't, of course, I could look forward to spending the rest of my life in realtime, grubbing around the woods of Pericles, hunting for my supper.

Once we were off the planet, there were even fewer options. The odds would be better—the two of us against Kurt—but the choices were still just as limited. Any plan that left Haynes at Theta Persei while we went on to Delta Tri would require violence against my uncle. That would mean a Family Council for me and, once again, a life stuck in realtime, albeit in more comfortable surroundings.

And if I just refused to take part—thus ending my business career with the family—Kurt would commandeer a family ship and take care of Haynes that way.

Anything I could have done to try to save Haynes would have been a romantic, futile and self-destructive gesture.

I was not happy being a member of this clan of bullies and thugs, but I wasn't prepared to turn my back on them yet. One day, perhaps I would be, but it would be at a moment and under conditions of my own choosing—not now and not over this.

It struck me then that Uncle Kurt had another reason for doing this. He wanted to involve me in the crime. By piloting the spaceship that carried Haynes into exile, I would share in the guilt.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

It was like an initiation into a secret society. If I went along with the kidnapping, I would become a true member of the family, linked by my own moral culpability. I would be trapped just as effectively as Haynes—him on the outside, me on the inside.

That was a prospect I didn't like to consider. It was frustrating to see the plot working its way around us and still be unable to do anything to stop it.

But there were other things I could do. After all, my family was fabulously rich. And so was I, after a fashion. I broached the subject to Haynes directly.

"I've been thinking it over," I said. "There isn't a lot I can do to help you, but maybe I could do something for your wife and daughter."

"Something like what?" Haynes snapped back.

"I could buy them passage to Delta Tri on a commercial ship," I said. "Would they be willing to go?"

Haynes didn't answer right away.

I thought I saw tears welling up in his eyes, but I decided to exercise the better part of valor and looked away.

"I think so," he said after wiping his face. "And what do I have to do in return?"

"Tell me what you did," I said.

"That's all?"

"That's all."

He mulled it over for a long time, looking at me with intense blue eyes. I felt like I was being X-rayed.

"I'll consider it," he finally said.

It wasn't much, but I felt like I was making progress.

In six months on Pericles, this was the first chance I'd ever had to sit through the onslaught of a full-bore electrical storm. When Haynes quit talking, there was little left for me to do but listen to the noise and grow anxious.

I was glad when he spoke up again, but my relief was short-lived.

"It's beginning to sound a little rough out there," he said. "This is starting to turn into some serious lightning. How do you like our thunderstorms? The neon gives the air a low gap voltage. With a lower gap potential, it takes less time to charge up the thunderclouds to the point of discharge. That means you get discharges a lot more often."

Through the window, I could see large red streamers of light dancing through the clouds and rain and trees. The lightning snapped and hissed every few seconds.

"There's no danger of it hitting us, is there?" I said. "I mean this building is protected by a dozen or more lightning rods."

Haynes laughed. "Nothing short of a Faraday cage would save this place," he said. "The lightning discharges from so many points at once, it's impossible to ground them all."

The tearing hiss of a lightning strike roared uncomfortably close and the rain splattered through the yard with renewed energy. I was fascinated by the storm, but I was beginning to wish Haynes would change the subject.

"How much do you know about the main lasercomm line from Earth?" he asked suddenly.

The question took me by surprise.

I knew just about what anyone did, but when confronted immediately forgot it all. I stammered as I recited what I could.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The network of giant communications lasers centered at Sol ties together the dozens of worlds settled by humanity. With a telescope, you can see them around the inhabited stars. I forget how many gigawatts or terrawatts or whatever the lasers are, but they shine brightly enough so that even a small scope will do.

They burn continuously with outgoing traffic—letters, reports, orders, information and everything else imaginable. The private stuff is routed around the stars, the public stuff goes on the news and into libraries. And in the Perseus Sector, the libraries are all owned by den Kolberg.

The reason for that is simple—there are only a few things that you can transport reliably from one world to another without losing their value. One of them is money, one is people and another is knowledge. We tried to be masters of them all.

That's what I told Haynes.

"Very good," he said. "For a member of the evil elite, you show remarkable promise. Now tell me how much you know about the forbidden indexes?"

"The what?"

He looked at me carefully again before answering. "Forbidden indexes. References and books and journals that are on the proscribed list. Haven't you ever heard of them before?"

"I can't say that I have. What are they? And who does the proscribing?"

"I don't know if you're naive, innocent, or just diabolically clever," Haynes said, shaking his head sadly. "I thought all of you were in on it, but maybe I was wrong. Maybe it's one of the family secrets that even the family doesn't know about."

"I still don't understand."

"Then let me put it bluntly: your family is censoring the main laserline from Earth."

"They're what?"

"Censoring the line. They're keeping things from the World Library out of the local branch."

"What kind of things?"

"Politically sensitive things, Alex. The kind of things that get people like me in trouble."

I was stunned. It wasn't that I didn't think my family was capable of such a thing—of course they were. I just couldn't believe that no one had told me.

"I was taught that most societies tend to suppress ideas that don't support the dominant social order," I said. "I suppose den Kolberg isn't any different."

"You can say that again."

"How do you know about these forbidden indexes?"

"Because your family isn't doing a very good job," he said with a smile. "Things slip through. References in other articles. Stuff that's so esoteric, your censors don't even know its radical. That's how I stumbled on it.

"I'm an econometrician. I deal with graphs and stuff. You know, supply-and-demand curves. As price goes up, demand comes down to meet the supply. The way they teach it out here in this sector, it's all simple stuff. The graphs are all straight lines, the equilibrium points are all perfectly predictable and den Kolberg gets all the money.

"But one day I started to wonder what it would mean if the graphs weren't

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

straight lines. What if they were higher-order functions, you know, curves?''

''What if?''

''Well, for one thing, there could be more than one equilibrium point. Sure, the economy is stable with den Kolberg controlling investment and financial policy. But if the graphs are all curves, it could be stable under a different social structure—under a lot of different social structures.''

''That makes sense,'' I said. ''But how does that tie into the forbidden indexes?''

''I started researching the idea. I'm smart, but not that smart. I figured anything that obvious must have been thought of on Earth centuries ago. By now, they must have worked it out in chapter and verse to the nth degree. I went looking, but I couldn't find anything. At least not at first. But then I started working my way back from more conventional stuff until I found the references the censors had missed.

''The stuff I found was all by conservative economists. They don't like the idea of curved graphs instead of straight lines. They treat it like some kind of black magic. They wish it would go away and they spend a lot of energy trying to make it do that.

''The index numbers—they were the key. Those conservative articles had references whose index numbers aren't listed in den Kolberg libraries. The more I researched, the more numbers I found. After a while, I realized it couldn't be a mistake. There had to be something going on. Someone had to be behind it. It didn't take long to figure out who.''

''Is that when you transferred out of den Kolberg University?''

''Yeah,'' Haynes said, narrowing his eyes in surprise. ''I guess you have been watching me. I decided it wasn't safe to keep doing that kind of research at a school your family controlled. I thought City U. would be safer. I guess I was wrong.''

''With my Uncle Kurt around, no place is safe,'' I said. ''Is that what got you in trouble?''

He shook his head slowly.

''There's more to it,'' he said. ''But I still haven't decided if I can trust you. Besides, this cabin could be bugged. I don't want you recording my confession, if you know what I mean.''

Haynes stood up and walked over to the fireplace. ''Is there any more beer?'' he asked.

I called for one of the brown suits to bring us two more mugs and sat back in my chair.

My body and spirit tingled with a strange energy at this realization. Suddenly a whole universe had appeared before me whose existence I had never even suspected before. Weren't we a clever little clan?

I could hardly believe what Haynes had told me—but I could hardly believe otherwise. There was evidence of the truth everywhere. You could see it in what I'd been taught at the business institute. They called it worker management, but it was really practical social control. The idea was to get people to do what was good for den Kolberg instead of what was good for themselves.

Colonial development is hard work and it takes a big commitment—especially in the early stages. My family couldn't afford to let troublemakers get

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in the way, so they were careful about what they let people get away with.

But that was decades ago.

Now the Perseus Sector was coming of age. Seven systems within a dozen or so years of Pericles were on the verge of industrialization.

They were whole new worlds—more sophisticated, more diverse, and more powerful than the older colonies on Tik and Asgard, where our power was deeply rooted. But we were still using the same tactics we had employed to keep the early agricultural labor force on the young worlds in line.

After listening to Haynes I was beginning to see that those tactics weren't going to work forever. Not if the family was going to base its political control on denying access to information.

There would always be people like Haynes who would figure out the truth on their own. The Kolberg den just wasn't big enough to handle all of them. If we continued to exile them, we were just going to spread the word around. The only alternative would be elimination.

And while Uncle Kurt might have been willing to resort to that, I don't think the rest of the family would have put up with it. If Great-grandmother heard about it, that would be the end of my uncle. I don't think he would be able to handle being grounded in realtime.

The guard returned from the kitchen with two more mugs of beer when I heard a strange sound—a low humming that was audible even above the hissing thunder. I had time to be puzzled by the noise, but not enough to think about it.

Suddenly all the hair on my body stood on end. The fire roared bravely and a bluish glow appeared on the rack of spears at the rear of the lodge.

It all seemed to happen so quickly, but there was also a timelessness to it all as a wall of orange-red fire crashed through the front door.

The fire rushed across the room, raising a curtain of light between the floor and ceiling. The guard in the center of the lodge dropped the beer mugs and stared at the invading plasma. The roar of the lightning filled my ears.

I stood there amazed at first. Then I jumped from my chair and fell to the floor behind it, bruising myself as I collapsed in a pile instead of landing in a catlike crouch.

Then the arc was gone.

Where it had passed, a line of popping and crackling flames now ran along the floor. Tendrils of white smoke mushroomed into the air from the fire.

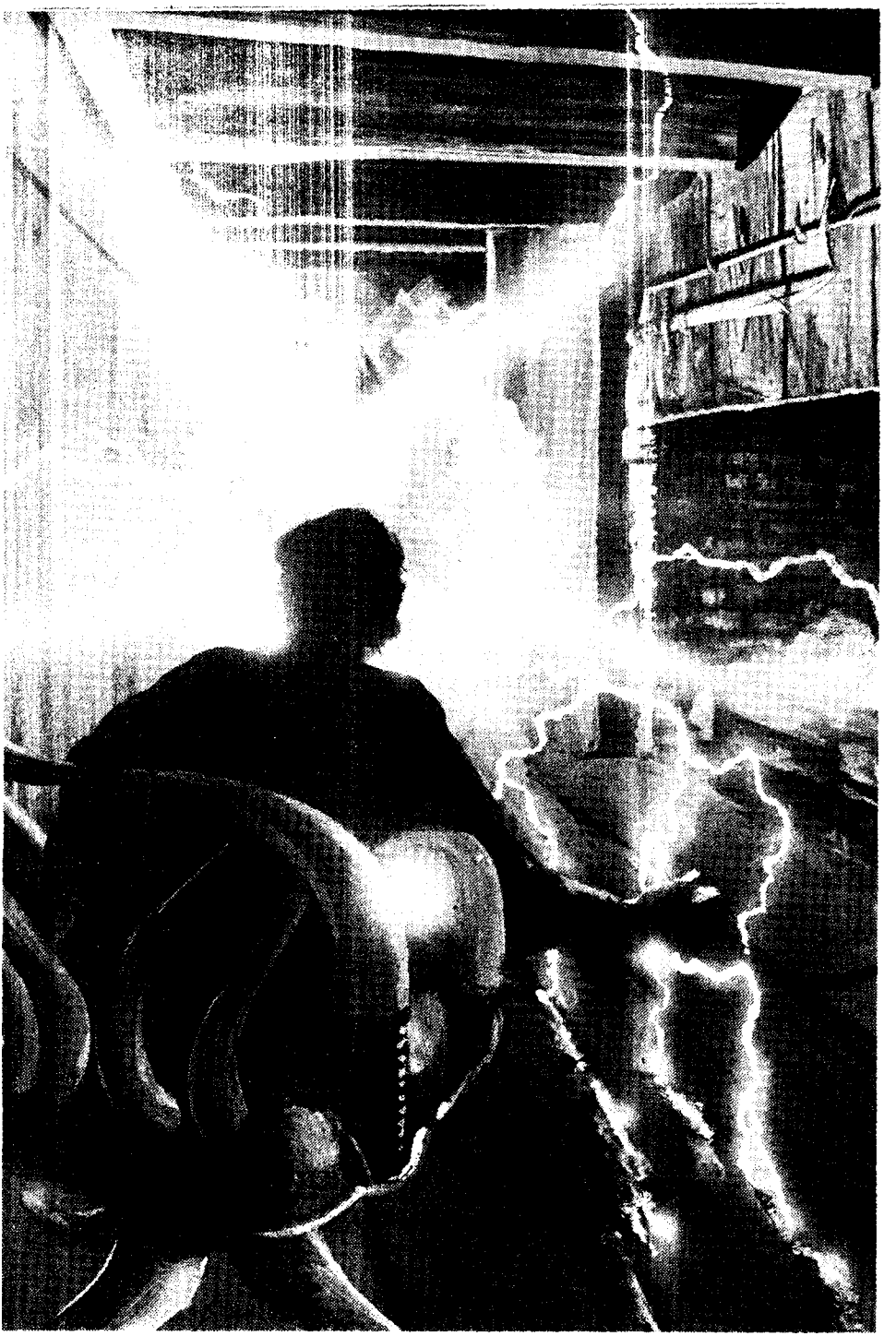
I looked up at Haynes. He was staring at the door, which had been blown open by the sheet of lightning and now was alive with flames. He looked down at me, then back at the door.

I could almost tell what he was thinking.

Freedom was only a few steps away. He could be lost in the stormy forest in a minute, before anyone could hope to catch him. But he didn't move—he just looked at the door. Why didn't he go? I almost wished he would, but I realized that he must have already weighed the alternatives and found them as uninviting as I had.

While he hesitated, the fire took hold across the room. The guards attacked it with rugs and blankets while I tried to get to my feet. No one was keeping

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a close watch on Haynes, and he seemed just about ready to make his move.

Then I put my weight on my left leg and felt the pain lance through my knee.

I think I screamed, but I'm not sure, because all the blood ran out of my head for a minute and everything grew quiet. When the sound returned, I felt Haynes's strong hands clutching at my clothing as he pulled me from the lodge, plunging backwards through the flaming doorway at the last moment with his jacket over his head and mine.

The rain stung my face, but I was glad to be outside where there wasn't any smoke. I looked around at the aftermath of the electrical storm. Smoke rippled from tree trunks seared by its passage and the ground was littered with branches, pine needles, and fern moss.

Then I saw the flames on Haynes's clothes. I pulled him down to the ground beside me, ignoring the lancing pain in my leg, and beat at the fire with my hands. He joined me and a minute later, with the help of the rain, we put it out.

We coughed and laughed and wiped the rain from our sooty faces. Haynes hoisted me up on one shoulder and we made it to the cover of a nearby fern tree. He lowered me to the ground, and I propped my back up against the trunk. Then he pulled off his smoldering jacket, set it on the wet ground and sat down beside me.

"Let me tell you the rest of the story," he said.

I should have guessed it myself, of course, but I was too busy being struck by lightning.

Haynes had done more than discover the existence of the forbidden indexes. He'd gone looking for them himself.

"It was simple, really," he said. "I just hooked my computer up to a telescope and tuned in to the World Library transmissions—straight from Alexandria. The equipment required isn't sophisticated. An ordinary lasercomm set and a moderately powerful computer are all you need.

"You should see this stuff. It's not just political dynamite—it's a whole world of radical social science. What we were saying before about your family, only spelled out in graphs and tables and formulas.

"Have you ever been to Earth? The whole planet is full of radicals. And they've spent the last two centuries studying our worlds and your family. The forbidden indexes lay it all out. There's more than a dozen worlds out here in the Perseus Sector, and their economies are all controlled by your family. On the surface, it's a simple case of capitalist development controlled by a tiny, powerful elite. But when this has happened on Earth, the elite was always a part of the society. Its members aged and developed generation by generation as the society did.

"Your family isn't doing that. The same individuals have been making decisions about our worlds for hundreds of years. And they've been deciding things in ways that serve their own narrow interests. In the meantime, normal economic, political, technological, and social development is slowed by the time it takes for you to travel from star to star.

"History—the common development of humanity on all of its worlds—has

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

stopped for most of the people who live on those worlds. It only happens for the small elite, who skip across the decades as they skip across interstellar space.

"And on top of it," he said, "the social development of the worlds out here is being held hostage to your wealth. In order for your space traveling family to accumulate vast amounts of property, you have to perpetuate the social norms that allow private ownership of that large a share of our economic resources."

He was right and I knew it.

I felt so powerless—and yet at the same time I felt filled with a strange new power that grew out of the knowledge of my family's darkest secrets laid out before my eyes. Mother, Uncle Kurt, the rest of them, all guilty of a massive betrayal of the people of the Perseus Sector—a millenial conspiracy to milk the worlds of their wealth down through the centuries.

But Haynes wasn't done yet.

"Now all that knowledge doesn't bother your uncle and the rest as long as it stays locked up on Earth. What they're afraid of is something much worse. You see, the radicals know more than just your family's sins—they know how to get rid of you.

"They lay it out, step-by-step, measure-by-measure. Organizing methods, political pressure, legal tactics, economic sabotage. After this many years of studying you, they know all of your weak points. They're very clever back there. They keep trying to tell us what to do out here, too, but your family doesn't want to let this stuff get out."

"No wonder Uncle Kurt wants you out of the way."

"When he first picked me up, I didn't think he knew quite how far I'd gotten. But I guess if he's going to carry me off to Delta Tri, he knows it all. Tell me something, Alex den Kolberg," he said, using my name like a curse. "Were you serious about helping my wife and daughter book passage?"

"Absolutely," I said. "I swear by the Academy Honor Code. A cadet does not lie, cheat, or steal."

"Honor's not a word your family uses very often."

"I am not your typical den Kolberg."

He looked at me, his bright eyes catching the red glow of the fading electrical storm.

"No, I guess you're not," he said.

The guards finally emerged from the rear of the lodge a short time later after giving up the fight to put out the fire. They all made it out, though I'm not sure how. The blaze from the building threw dancing shadows across the trees and warmed my rain-soaked body.

They took their time finding a first aid kit in one of the other buildings. One of them brought it out and attached it to my knee while the rest of them opened up the spare cabin and cleared the cobwebs out so we could all move in.

It seemed like an eternity before the painkillers kicked in.

Uncle Kurt came back the next day.

Theta Per was a big white ball burning in a deep blue sky. I could feel the UV tingling my skin as we crossed the tarmac to the *Perseus Wanderer*. There were seven of us—Kurt, Haynes, me and four janitors. The janitors stopped

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

at the ship's main hatch. They wouldn't be going on this ride.

We went aboard and climbed the spiral ladder to the main deck. That was a real struggle for me—the first aid kit was still attached to my knee and wouldn't let me bend my leg. I sat in the pilot's chair crosswise and keyed in the launching commands.

I moved the ship off the ground, slid it across the landing field, then initiated the launch. We headed straight up and out, not even bothering with an orbit.

Once we were free of the atmosphere, I keyed in a message to a family business agent—one I could trust to keep his mouth shut—to take care of Haynes's family and fired it back at the planet. We were still climbing out of Pericles's deep gravity well when I got the reply—the tickets were already being delivered and they would follow within a month.

A few hours later, with Pericles far behind us. I programmed our course into the soliton drive.

Then I inserted the oversize plastic key into the slot in the center of the control panel and turned it in place.

For one immeasurably brief instant, the ship and all its contents became a single particle of energy.

Time did not pass within the soliton field, but the particle moved—at the speed of light.

Outside the field, children were born and grew into adolescence, seasons turned, old men and women died, careers were made and reputations built, new towns arose in the wilderness of a hundred worlds and wealth continued to pile up in the den Kolberg coffers.

And when the instant was over, the particle decayed, the *Perseus Wanderer* was flying under the light of Delta Trianguli and it was fourteen years later.

Turning that key always made me feel like I was firing a gun into my own head—it was such a big leap and it was so irrevocable.

It took a few days to work off our proper motion and get down to Zoroaster. Uncle Kurt came to my cabin the nightwatch before we made orbit.

"He told you what he did, didn't he?" Kurt asked.

I looked at my clansman. His eyes were red and his features looked more gaunt than usual. Uncle Kurt did not enjoy space travel and did not weather it well. For the first time, I did not feel ill at ease in his presence. It was partly because here, we were on my turf, aboard my vessel. But it was also because now I knew the family's guilty secret and that knowledge gave me strength.

"Yes, he did," I said. There was no reason to lie.

"Then you understand why we had to be rid of him, don't you? That was the whole lesson here, Alex. If you can understand that, then you are one of us. If you cannot, then you might as well stay here with Haynes and let me go on home without you, because you'll never be a den Kolberg."

"I understand," I said. I did, too. But that didn't mean that I condoned it. Or accepted it. I was not going to argue the point with my uncle, however.

"You see, Alex, whether we like it or not, we occupy the center of the stage here in the Perseus Sector. Great-grandfather and the rest of the founders saw

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a role for a spacefaring commercial den. They realized what we could accomplish if we traveled from world to world while our financial holdings continued to grow. But they also knew what they would have to do to maintain that system. We can't allow people like Haynes to undermine it. There's just too much at stake."

"I know," I said softly.

"He's lucky, you know. In Great-grandfather's day, he'd have just disappeared. Quite a few did. But Great-grandmother doesn't like that kind of thing, so we take other measures today." He flashed a sickly smile.

"So now you're one of us. The blood is on all our hands, you know. It's one of the things that binds us together and makes us a family."

"Yes, it certainly does that," I said.

He clapped me on the shoulder and nodded his head. "You'll make a good den Kolberg," he said.

I could hardly believe his words. Did he really trust me? Or did he see through me and recognize the false heart behind the lie? Maybe he did, and the duplicity was what he was praising.

But as I looked into his eyes, I saw the haggard soul of the Kolberg den. He was desperately alone in a way only a star-hopping traveler could be. That was our curse, to be forever uprooted. No wonder we clung so tightly to each other, accepted each other's betrayals and tolerated each other's lies. We were like ghosts, haunting the worlds that we owned and that we continually tossed into the past each time we moved along. All we had to keep us together was each other.

That was why he would believe me no matter what I said.

The next day, we landed on Zoroaster. I dropped off Kurt and Haynes and started making plans of my own.

I wasn't going to wait around to see if his wife had used the tickets or not. I don't think I could have handled it if she'd turned them down. A few days after we landed, I took the *Wanderer* up into space alone for a while. I made a big elliptical orbit with Zoroaster, so I didn't think anyone would be able to follow me.

When the time came, I broke out the navigational telescope and trained it on Sol, which burned softly in the heart of the Milky Way. I found the laserline in the eyepiece without trouble. Then I fed the image into the lasercomm equipment and let the ship's computer drink its fill.

I could hardly stand waiting the time it took to download the files.

Haynes had written down the index numbers for me and now I fed them into the computer. The references rolled up on the screen.

"The Impact of Elites on Social Progress in the Perseus Sector . . .

"Social Control in the Early Colonies . . .

"Economic Impact of Private Interstellar Estates . . .

"State-Controlled Work Assignments as a Device for Political Control . . .

"Political Repression and the Media on Tikarahisat . . .

"Schools and Indoctrination: the den Kolberg Model . . ."

He was right—they were there. They scrolled on and on and on, article after

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

article, charge upon charge, an endless bill of indictments against the Kolberg den, extending back three hundred years to its very founding. I could barely contain my excitement.

Then I started to read. ■

FUTURES

(Continued from page 63)

Lucas, "I'm trying to make a classic space fantasy in which all the influences are working together. . . ."

And watching the film made me respect the accomplishment. While *Close Encounters of the Third Kind* (1977) grows exceedingly annoying with repeat viewings, *Star Wars* has an innate sense of ingenuousness. There's a thrilling sense of universe beyond, that here—for the first time—someone really created a world in a SF film. Agreed, there is much technical nonsense—like the roar of the tie fighters in the vacuum of space. But this is a fantasy, as it signals with its opening scrolling introduction.

And the effects are still marvelous to look at, never grandstanding for their own benefit, always in service to this prototypical epic of a boy and his dad. This wide-screen version of *Star Wars* recaptures the grandeur, and the excitement, of the original film.

Of course, you will need a laserdisc player to enjoy this film. Fortunately, six manufacturers are producing combination players that play both CDs and all the laser disc formats. The prices have come down, and if you're at all interested in films, it's a machine that you should consider.

For a long time Pioneer was the only manufacturer of discs and machines. Their new combi player CLD 1070 is a state of the art player, which plays both CDs and laser discs. The digital sound is wonderfully clear; you can scan to any point that you wish and mark it for repeat viewing. Yamaha's CDV-1000 is also another affordable combi-player.

Some discs, like the Criterion Collection's *Forbidden Planet* and *2001*, are in the CAV format which lets you freeze each frame. Fueled by people with high-resolution TVs, discs will be offering wide-screen, digital stereo goodies such as *Aliens* and *Ghostbusters* that will make it hard to be happy with the resolution of the VHS videocassette. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The Alternate View

MORE ABOUT WORMHOLES—TO THE STARS IN NO TIME

John G. Cramer

© 1990 by John G. Cramer

This column is a follow-up to a previous Alternate View (*Analog*, June '89) about "wormholes," faster-than-light travel, and time machines which was based on a spectacular theoretical breakthrough in general relativity. It described how a sufficiently advanced civilization might construct a stable wormhole (a curved-space shortcut between one region of space and another) and use it both for faster-than-light travel and for time travel, with no laws of physics violated in the process except *causality* (the principle that a cause must precede its effects).

Kip Thorne and his Caltech colleagues Morris and Yurtsever showed that according to orthodox general relativity (presently the standard theory of gravitation), it should be possible for a civilization with a sufficiently advanced technology to extract a wormhole from the "quantum foam" that exists at ultrasmall distance scales, to expand the wormhole to macroscopic dimensions by supplying energy, and to stabilize it by placing very large electrical charges at both wormhole mouths. The wormhole mouths (or portals) could then be transported to widely separated regions of space to provide superluminal communication and even faster-than-light travel. Moreover, if one of the wormhole portals was accelerated to a velocity near that of light, kept at that speed for a year, and then decelerated and returned to its stay-at-home twin, the pair of portals would constitute a time machine that could be used for two-way communication and transport one year into the future or the past. Clearly this is the gimmick that SF based on hard science has needed for many years: plausible methods for faster-than-light transport and time travel. To use it, however, we must improve our understanding of wormhole physics and its implications.

Consider for example the law of conservation of energy as it applies to wormholes. If the two wormhole portals are at rest with respect to each other there should be no energy cost in moving a massive object through the wormhole from one portal to the other. But suppose that one wormhole portal is at rest on Earth while its twin is aboard a space ship moving away from Earth at the "special" velocity of 86.6% of the speed of light, a velocity such that an object's total mass-energy is composed exactly half of rest mass-energy and half of kinetic energy. One marvelous advantage of placing a wormhole portal aboard a ship is that it can be used to *refuel* the ship in flight. The burden of carrying all fuel aboard the vessel as initial payload is eliminated: fuel can be simply piped aboard through the wormhole portal. Suppose we push a 1 kilogram (kg) mass of fuel through the Earth

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

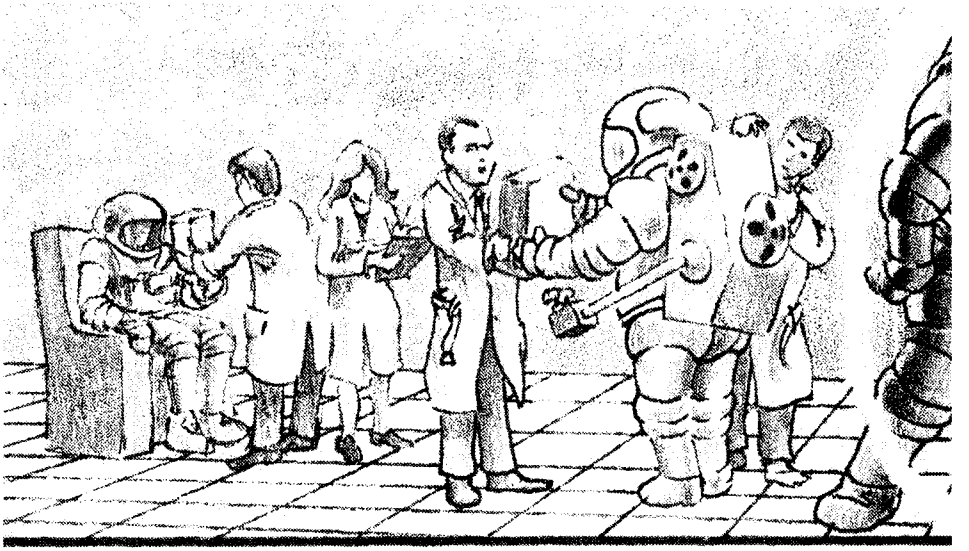


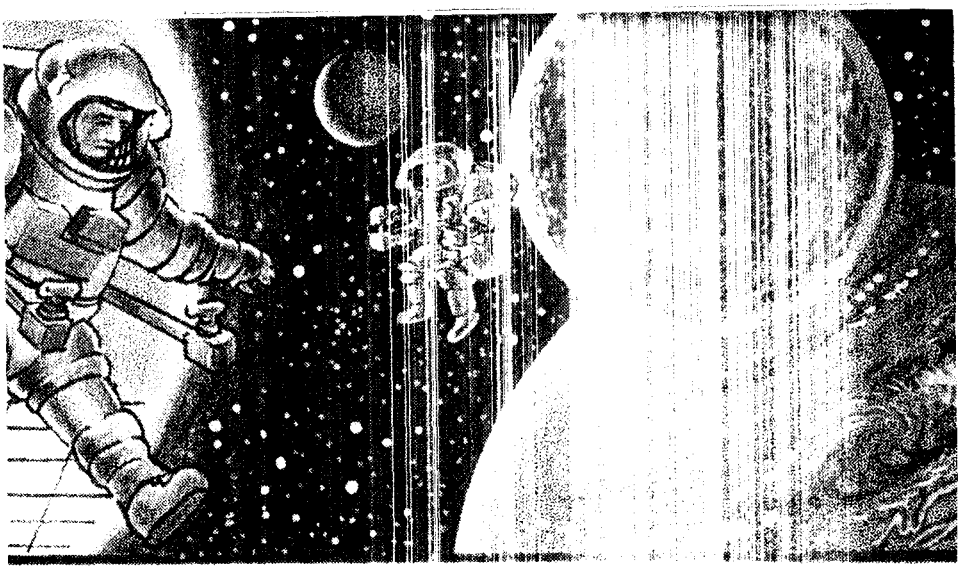
Illustration © 1990 by William R. Warren, Jr.

portal so that it emerges at the ship portal. It has been moving quite slowly on Earth and in the local space of the wormhole, so it emerges in the ship traveling at the same speed as the ship or 0.866 c. But the mass of the fuel, as far as Earth-based observers are concerned, has just speeded up to 86.6% of c, and its 1 kg mass has just increased to 2 kg. How did it acquire this extra mass? Isn't the law of conservation of energy violated by this speed increase and mass gain?

The answer is *no*, energy conservation is not violated in this process. The fuel interacts with the wormhole as it passes through the throat connecting the two portals. If the ends of the wormhole have relative motion, the fuel will steal some mass-energy from the wormhole, the fuel gaining a kilogram of mass while the wormhole loses a kilogram. Since the diameter of the wormhole depends on its mass, the throat will constrict slightly from this process unless the energy is replaced by some power source. Because of this, refueling a moving ship via a wormhole portal will not be cheap. If the wormhole is to be maintained at a given size, pushing one kilogram of mass through will require adding make-up energy equal to mc^2, the kinetic energy given to the moving fuel. For 1 kg of mass, this amount of energy is 9×10^{16} joules or 2.5×10^{10} kilowatt-hours. Now 100 kilowatt-hours of electrical energy costs about a dollar at the lowest industrial rates, so it would cost about $250 million to supply the ship with 1 kilogram of fuel, a non-trivial sum even by the standards of the space program. Presumably, however, an advanced civilization would have lower power rates and a better-funded space program.

But the main expense would not be on-the-fly refueling of a ship but the cost of producing the wormhole, constructing the ship to carry it, and boosting the ship to near-light speeds. And

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



even if this were done, it would still require years, even decades or centuries of Earth-time for such a ship to reach a destination in another star system. It all seems very inefficient and expensive. Surely, given a technology advanced enough to produce and stabilize wormholes in the first place, there is a better way.

And perhaps there is. Consider the following question (first posed by a young woman at a talk I gave on wormholes at the recent Boston Worldcon): if a very fast starship sets out to carry a wormhole portal to, say, Tau Ceti—11.9 light-years away—and the ship has a speed of, say, 99.995% of c giving a time-dilation factor γ of 100, how long will Earth-based observers have to wait before they can begin to use the wormhole portal to travel to Tau Ceti?

One would think that the Earth-based observers would have to wait at least 12 years for the ship and wormhole portal to arrive [illegible] is not [illegible] a region [illegible] the other side of the portal [illegible] system of space time on the other side only the spatial locations but also the time locations as measured by the passage of time on each side are connected. The wormhole portal aboard the ship experiences that same time dilation factor as would a passenger aboard the ship. Because of this time dilation (the clock-slowing phenomenon of special relativity) the trip takes only 0.12 years or 44 days as far as the passengers and the wormhole are concerned. An Earth-based observer, watching the trip through the wormhole, would view the ship arriving in just 44 days.

Therefore, since the shipboard wormhole portal arrives at its destination in 44 shipdays, the Earth-dwellers can begin to use the wormhole link for communication and travel to the Tau Ceti system just 44 days after the ship leaves

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Earth! With no violation of known physical laws (except causality), a direct link to a star 11.9 light-years away would be established in just 44 days or 1% of the time it would take a photon to travel to that star. To those of us who have been bumping our noses against the lightspeed barrier for many years this is an amazing result. With wormholes we could get there in a time much shorter than the transit time for a photon.

But wait! There's more! If you think about it, it's pretty inefficient to use a spaceship to transport the wormhole. The ship adds extra mass which must be accelerated at great energy cost and then decelerated again. This raises an interesting question: *why not just send the wormhole portal without the ship?*

There are several serious problems with this proposal. Without a ship, how could you accelerate the portal to the necessary near-light velocity? How could you guide it and make mid-course corrections so that it would arrive at the desired destination? How could you decelerate it when it reached that destination? How could you use it after arrival, with no equipment or crew on the other end?

Even if stable wormholes are possible, these problems may be insoluble. But there is a plausible scenario for solving them. To provide the needed acceleration, consider a conventional particle accelerator like the proposed Superconducting Supercollider (SSC) to be constructed in Waxahachie, Texas in the 1990s. The SSC is designed to accelerate protons to near-light velocities that give a time-dilation factor of $\gamma = 20{,}000$. This is to be done with "conventional" technology, orbiting the particles repeatedly through a series of superconducting magnets and accelerating cavities.

Now consider a stabilized wormhole which is deliberately arranged to have a very small mass, a few micrograms or less, by giving it a relatively small amount of energy. Such a wormhole, according to MTY, is stabilized by placing large electric charges in both of its portal openings. If, once the charges are in place, they remain there without the assistance of external machinery, then the wormhole portal is in effect a stable massive particle with a large mass and a large electric charge. A properly designed SSC-like structure could accelerate this wormhole portal, just as the SSC accelerates protons. In fact, if the wormhole portal has approximately the same charge-to-mass ratio as a proton, the same accelerating structure will serve for accelerating both. In that case the SSC could also accelerate wormhole portals to a time-dilation factor γ of 20,000, a nice value, as we shall see, for exploring the nearest hundred thousand light-years of our galaxy.

So, given small stable wormholes as a starting point, we should be able to accelerate wormhole portals to $\gamma = 20{,}000$ and send them out in the general direction of promising nearby star systems. Such an accelerated portal, if it was on a straight-line trajectory, would reach Tau Ceti in just 5.2 hours of portal-time. A wormhole portal would not, however, travel on a straight-line path. All charged particles traveling in the magnetic field of the galaxy will move on curving paths that cannot be

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

calculated because the magnetic fields are not known. Thus, it would be necessary to observe their paths in detail and make mid-course corrections.

Since photons can travel through the wormhole portal, if it is expanded to a diameter of a few hundred nanometers, the location of the portal as it travels could be monitored by observing the light that passes through it as it moves. After corrections for the Doppler shifts and the relativistic forward folding of arriving light, it should be possible to deduce the location and direction of the portal from the images of nearby bright stars. Particle beams sent through the earth-portal in appropriate directions should serve as steering jets to make mid-course corrections and to provide deceleration of the portal once it reaches the distant star system which is its destination. When that destination is reached, energy can be added to the portal to expand it to a size that allows the delivery of manned and robot space vehicles to explore the new star system.

Thus, if stable wormholes are possible at all, they may represent a path to the stars that will sweep away many of our previous concepts and prejudices. And this brings us to a variation of the Fermi paradox: if this wormhole transport is possible, shouldn't the technologically advanced civilizations of our galaxy already be sending tiny accelerated wormhole portals in our direction? So where are they?

Perhaps they are already here. In "Children of the Swan," a previous AV column (*Analog*, 3/86) I described how a number of underground experiments had been detecting muons deep underground, produced by mysterious particles emanating from the Cygnus X-3, an X-ray object in the constellation Cygnus. Cosmic ray physicists generally agree that no known particle can produce these events. Another class of super-energetic cosmic rays, the Centauro events, appear to be particles accelerated somehow to incredibly high energies. They produce giant large-area showers of energetic particles when they strike our atmosphere. Like the particles from Cygnus X-3, the Centauro events lack any explanation based on known physics.

Cosmic ray experts conventionally assume that, whatever the origin and acceleration mechanism of these unexplained cosmic particles, they are a natural phenomenon, not an artifact of some advanced civilization. But that assumption could be wrong. It is interesting to contemplate the possibility that some advanced civilization may be mapping the galaxy with accelerated wormhole portals, sending little time-dilated observation points out into the cosmos as peep-holes for viewing the wonders of the universe. And perhaps, when a particularly promising or interesting scene comes into view, the peep-hole is halted and expanded into a portal through which a Visitor can pass.

Clearly we need to gain much more understanding of wormholes. They may be our path to the stars. ■

REFERENCE

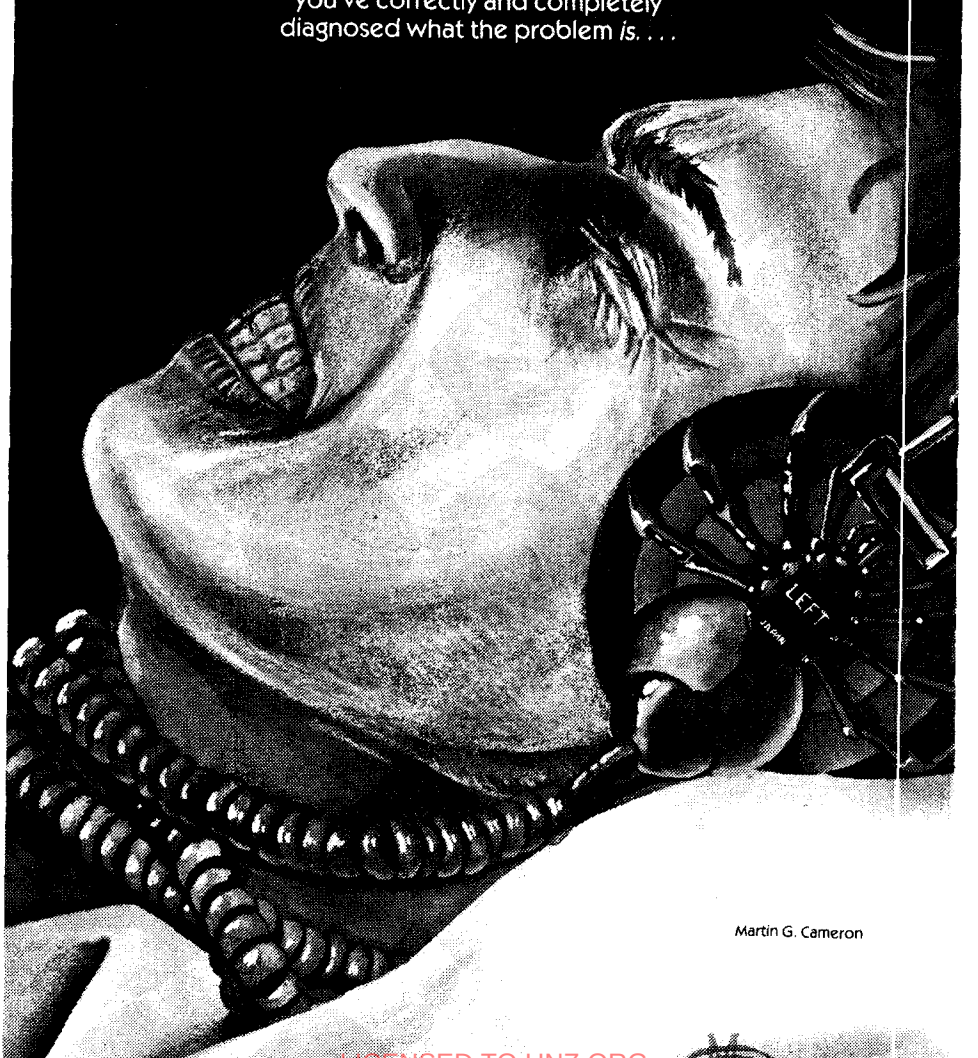
Wormholes, FTL, & Time Machines: Michael S. Morris, Kip S. Thorne, and Ulvi Yurtsever, *Physical Review Letters 61*, 1446 (1988).

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

SLOW NIGHTS

Kevin D. Robinson

Sometimes it seems quite obvious what's needed to solve a problem. But it's a good idea to make sure you've correctly and completely diagnosed what the problem *is*. . . .



Martin G. Cameron

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I call them "slow nights." After midnight, and peaking between 2 and 3 A.M., the digital clock radio just seems to gum up, its red glowing numbers taking longer and longer to yield the black screen to their patient comrades who wait somewhere in the electronic wings. Fatigue builds like a great weight, but the mind just won't shut down.

Everyone probably struggles with mild insomnia at least once in their life. Maybe it happens because of a sore back, a load of emotional baggage left over from the work day, or just an unbearably hot, humid summer night. I can remember not sleeping well on a couple of occasions, but until recently, bona fide insomnia was never really a problem. No, my only problem was something all together different. . . .

The advertisement in the back of *Bold New Age* magazine said:

> "Are you forgetting important things more often? Do your friends call you a 'space cadet'? The memories are all in there. . . . let Dr. Madeline LaForge help you learn to access them with speed and efficiency. Dr. LaForge's patented at-home memory enhancement program is the high-tech answer to your problem."

I had to laugh. My life was a collage of reminder notes. Most of them never did me much good, however, because I invariably forgot where I put them. I also had an embarrassing penchant for sealing and mailing important envelopes—both intolerably late and entirely empty. Only last month, I lost several of my favorite blue oxford shirts because I misplaced my claim ticket and couldn't remember where I had dropped them off to be cleaned. I even held the all-city library record for late fines. Dr. Madeline LaForge was probably just another mail order rip-off artist, but I liked the copy style and the telephone number was toll-free.

"Do you have a personal computer, Mr. Barnes?"

"Yes. An NCR."

"Good. A modem?"

"Yes."

"Stereo headphones . . . the full muff kind?"

"Yes."

"Very good," said the personable young man on the other end of the telephone line. "You've already got all the expensive stuff. If you take advantage of Dr. LaForge's fully guaranteed program right now, we will send you (for the price of enrollment and a small deposit fee) a loaner interface, enough cord so that your headphones will reach your bedroom while connected to your PC, and a toll-free access number into our central computer system."

"My bedroom?" I said. "Why do I need headphones in my bedroom?"

"That's the best part of Dr. LaForge's system," the young man answered. "You will re-collate and learn to re-access your memories without giving up a minute of your valuable waking time. The program is designed to run while you sleep."

I uttered some pathetic exclamation of disbelief and the young man said: "Welcome to the nineties, Mr. Barnes!"

The package arrived two weeks later.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Dr. LaForge's interface looked just like a top-secret military black box, its lid welded closed and signs around the unused screw holes indicated that permanent, fast-hardening sealant had been used to totally envelop the electronics within. It all hooked up to my computer easily enough, and the headphone extension cord soon snaked its way from my at-home office, down the hall, into my bedroom. They even sent a contoured pillow, especially designed to accommodate the bulky stereo headset.

The easy-to-follow instruction book was emphatic about using the program *only* during one's sleeping hours, and was equally insistent that doing so would *not* disrupt the user's rest. So, when my pre-bedtime regime was complete, I set up the modem, dialed the toll-free access number, and climbed between the sheets wearing my new age nightcap. At first the headphones delivered only elevator zombie jazz, but soon the music faded and a rough but feminine voice spoke to me in well-balanced stereo.

"Good evening, Mr. Barnes. May I call you Larry?"

"Sure," I foolishly replied to my empty bedroom before chiding myself with a reminder that this was, of course, a "read only" memory program. I made a mental note to remember my high-tech pun, but knew that, like all my other clever witticisms, it would be forgotten momentarily.

"My name is Madeline LaForge," the pleasant, authoritative voice went on. "I want to thank you, Larry, for choosing my memory enhancement program, and I want to reassure you that we *will* improve your recall proficiency . . . or return your money in full.

"I may speak to you briefly at the beginning of some sessions; but otherwise, you will be unaware that anything other than soft music is coming through your headphones. Our patented Subliminal Image Coding is computer-generated and will work in perfect sync with your normal sleep-mode brain functions to begin re-collating your memories in a way that enables you to retrieve them more easily. Good night, Larry."

I woke up well rested when my alarm went off, but it took me several seconds to recall why I was wearing my headphones in bed. The irony of forgetting brought a smile to my sleep-puffed face and, as I stumbled into the bathroom, I wondered whether or not it was too late to cancel payment on my charge card. Dr. LaForge could fool some of the people some of the time, but if I didn't see some sign of change, I would put her money-back policy to the test.

On the way to work, I stopped, quite impulsively, at the Holliday Cleaners, retrieved a claim check from deep within my car's sun visor pocket, and rescued my blue oxford shirts. When I arrived at Kelling, Kelling & Fraith, I walked into the board room and everyone stopped talking and turned in unison.

"What?" I said, looking down. "Is my fly open? What?"

There were chuckles around the room.

"No, Larry," said Jon Kelling. "It's just that you're *here*."

"It's Wednesday . . . isn't it?"

"Yes."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Staff meetings are still on Wednesday mornings, aren't they?"

"Yes, Larry," Faith Kelling said, giving me her patented indulgent mother smile. "But you've never remembered that on your own before. We always have to call down to your office. It's kind of become a ritual: our Wednesday morning devotional exercise."

More laughter.

"I could go back downstairs," I said, "and await your summons."

"That won't be necessary, Larry," Jon said with a grin. "Let's get started, people."

An hour later, Anne Wayne followed me out of the conference room and ushered me into the stairwell.

"Let's walk," she said, keeping one hand on my elbow. "Are you OK, Larry?"

"Sure, Annie. Why?"

"You just weren't yourself in there today."

Anne looks out for me. She and I are "Corporate Team Partners," but the firm really pays her to see to it that I work on the right sales campaigns, in the right order, at the right times. No one denies that I'm the best copy writer at KK&F, but they all seem to find my absent-mindedness (I've always liked to call it "single-mindedness!") threatening. Anne is their insurance policy against disaster.

"How long have I been your CTP, Larry?"

"Four years, three months, and seventeen days."

"There!"

"There what?"

"There you go again. Yesterday you couldn't have answered that question given a year's margin of error in either direction."

"Oh, really?" I replied, suddenly aware that I might be getting my money's worth after all.

"Yes, really! What's going on, Lar?"

I told her about Dr. LaForge's memory enhancement program and she just laughed and said: "No way. This is a joke, right?"

By the end of the week Anne wasn't laughing at all. She was appalled when my co-workers started calling me Johnny Mnemonic, but I didn't mind; in fact, I took it as a compliment. But behind my back—according to Anne—the other writers at the agency were writing gag copy for Dr. LaForge.

> "Are you a little slow? Can't remember your own name? Just call our toll-free number: 1-800-BEA-GEEK. (Order before midnight and receive absolutely free, a genuine plastic pocket protector.)"

"It's not *that* bad, Annie," I said several days later when she looked particularly distraught.

"Not that bad? You just recited the entire ingredients list for Mother Martha's Home Style Salad Dressing in front of Ross Fraith!"

"It just sort of came up."

"Xanthan gum and calcium disodium don't 'just sort of come up,' Larry. You've got to get hold of yourself. I'm glad your memory's better, but you can't just keep spouting off whatever bizarre bits of trivia come floating back to you."

"But—"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"No buts, Larry. It's been less than a week and you're already driving everybody crazy. First you're going to get yourself canned; then somebody's going to have you committed."

"Here," I said, interrupting her in the midst of an obvious over-reaction. "Look what I did at lunch time." I guided her into a nearby presentation room. Anne just stared at the wall-length blackboard and shook her head silently.

"It's the periodic table," I said, disappointed that she hadn't recognized it herself.

"I know," she said quietly.

"Don't you see?" I said, coming around to face her. "I flunked Chemistry. Couldn't remember enough of this chart to pass a ten question fill-in-the-element-name quiz. That was twenty-four years ago!"

For some reason, it looked almost like Annie was going to cry.

I didn't mind the razzing at work—and I quite enjoyed the seemingly effortless recall of so many bits of long-forgotten data—but after almost two weeks of Dr. Madeline's bedtime subliminal buzzing, I started having trouble sleeping. Not going to sleep (at first), but waking up too early, my brain awash in a frenzy of predawn fun facts. The first time, it was just amusing.

"Ramar of the Jungle!" I said aloud, bolting upright out of a dead sleep, nearly strangling myself in my headphone cord. "That's the weekly *Andy's Gang* television serial I couldn't remember!"

While most of my childhood friends were watching *Howdy Doody*, I was a die-hard fan of *Andy's Gang*. Andy Devine's voice was funny all by itself, but when he said, "Pluck your magic twanger, Froggy!" and that goofy frog appeared in a puff of smoke and said, "Hi ya, Kids. Hi ya. Hi ya," I always cracked up all over again. The show was sponsored by Buster Brown Shoes, but I had been trying, in vain, to remember the name of the weekly cliff-hanging serial for years.

After that, I woke up earlier and earlier, unable to stop the ceaseless stream of memories. Most of them were, if not pleasant, harmless enough; but, more and more frequently, darker past experiences came rushing back unwelcome . . . recollections better left forgotten. When some of them became nightmares, I stopped sleeping altogether and called Dr. LaForge person-to-person.

"You're due to complete the normal program this week anyway," Madeline said sweetly. "Why don't you just go ahead and send back the equipment now?"

"Sure," I said, "but what about sleep? I can't just lay awake at night remembering everything I've ever done, read, or seen."

"Your symptoms are probably just a temporary overreaction to a particularly successful program. You have been suppressing memories (good and bad) for many years. Now that the floodgates are open, it may take some time for your mind to readjust. I wouldn't worry about it. Just give it time."

A month (and dozens of over-the-counter medications) later, I realized that I needed more extensive help. Slow nights are barely tolerable when they

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

occur only occasionally. When they follow one another unendingly, life itself becomes a nightmare.

Dr. Francis Engle looked promising. Her magazine ad promised peaceful, relaxing sleep . . . guaranteed or my money back. By that point, I was willing to try anything; and besides, the price seemed quite reasonable, considering.

* * *

"Do you have a personal computer, Mr. Barnes?"

The young man's voice sounds familiar, but I'm not about to go digging for more lost memories at this point. Not that it matters anyway . . . so long as I can get some sleep.

"Yes. An NCR."

"Good. . . ." ■

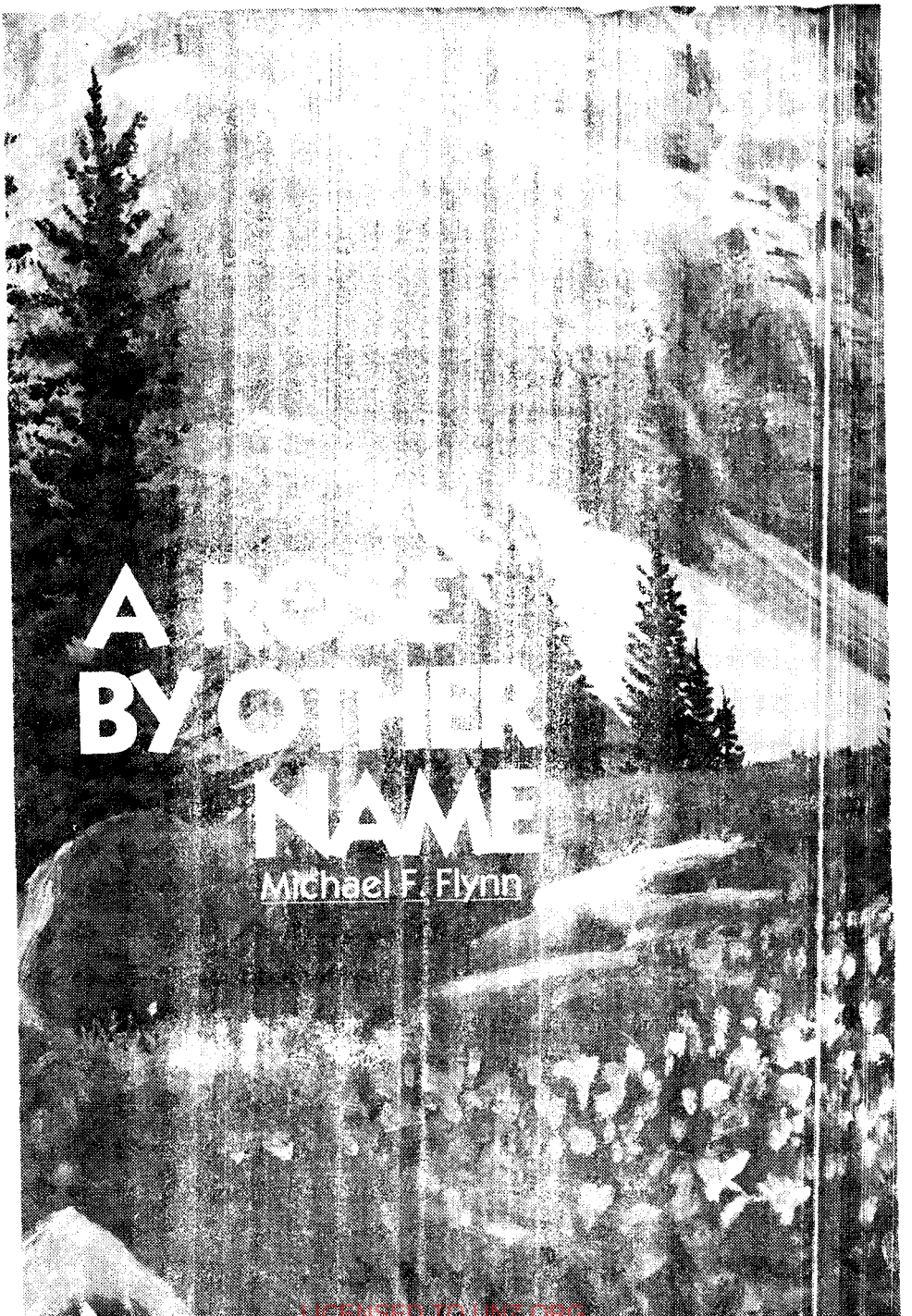
IN TIMES TO COME

●Our June issue might be called an "atmospheric special." Vincent Di Fate's cover is for Tom Ligon's "Funnel Hawk," a novelette that exemplifies the research principle that to study something well, it helps to go where the data are. When the subject is one of the most violent forms of weather on the planet, that isn't easy. But meteorological violence is not a matter of mysterious new kinds of physics; it's just that some of the numbers are bigger than we're used to. On the other hand, improving technology makes it possible to put unaccustomed numbers into design specifications, too—so why *not* fly right into a tornado? Of course, the physical obstacles, formidable as they are, are by no means the only ones to be overcome . . . .

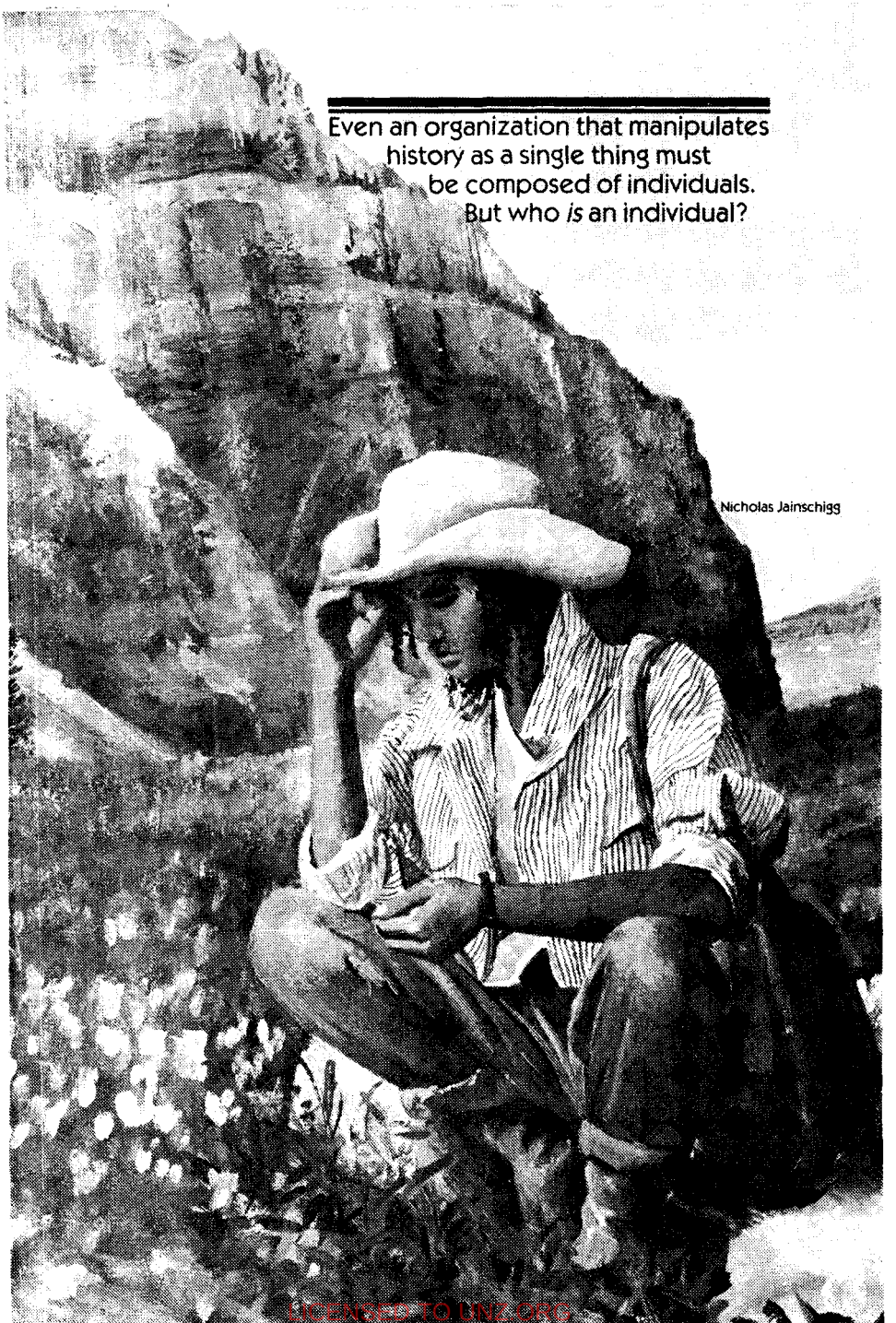
Geoffrey A. Landis's fact article deals with an atmospheric problem of a completely different kind: "Air Pollution on the Moon." You probably don't usually think of the Moon as having an atmosphere to pollute, but remember that the best vacuum in the real world is really a very thin gas. When you start with very little, you don't have to add much to develop a significant pollution problem. Significant to whom? Well, talk to some industrialists a few decades hence. . . .

Meanwhile, we'll have the usual features and a variety of fiction, including stories by F. Alexander Brejcha, Amy Bechtel, and L.A. Taylor.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNS.ORG
ELECTRONIC REPRODUCTION PROHIBITED


Even an organization that manipulates
history as a single thing must
be composed of individuals.
But who *is* an individual?
Nicholas Jainschigg

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I

"But I don't *want* to become someone else!"

Red Malone was sitting on the fence post, enjoying the mountain air and watching the horses graze in the corral. His left shoulder was heavily bandaged and his arm was bound up in a sling. He had hooked his feet around the lower rail of the fence to help keep his balance. The soft breeze falling down from the high country rustled his shirt and created waves in the grama grass of the horse pasture. The mares were clustered around the fence line on the far side, cropping the grass. Their stallion stood nearby, watching Red suspiciously.

When he heard Sarah Beaumont behind him, he didn't turn. "None of us do," he answered her.

"The rest of you don't have to," she said bitterly.

He did turn and look at her, wondering if she could be so blind. She was dressed cowgirl fashion, in tight jeans and checkered shirt. The white straw Stetson contrasted sharply with her skin. Red was still wearing his city clothes. He returned his attention to the horses. "Sometimes," he said. "From time to time."

She threw herself at the fence rail next to him and rested her chin in her arms. Red looked down at her. She was gazing out at the horses, a scowl across her face. "Dammit, Red," she said. "I spent years making myself into what I am. I worked hard at it, and it wasn't easy, and I like the way I turned out!"

"Then you're lucky. Most of us would do major alterations if we could. What are you carping about? Your new persona will be wealthy, secure. We take care of our own. A little plastic surgery, too. Maybe lighten your skin a shade or two. Your own mother wouldn't recognize you."

Sarah's eyes went dead and she looked down at the grass. "She wouldn't know me now," she said quietly.

He wanted to say, *Well, then it won't make any difference;* but he sensed it would be the wrong thing. He watched as the stallion came suddenly alert, ears twisting like twin radar antennae. The horse trotted a few paces to the high ground at the rear of the pasture and stared like a statue at the mountains above. After a while, he relaxed and resumed his station by his mares. Red wondered what vagrant scent the mountain air had brought to his nostrils.

"It's for your own good, Sarah," he said finally. "Haven't you been watching the news lately? Ever since you spilled the beans about the Babbage Society, the television newsreaders have been ripping you apart. 'Paranoid' and 'mentally unbalanced' are the kindest things they're saying. Why not become someone else? Being Sarah Beaumont can't be a pleasant prospect these days."

"It's a dirty job," she said wryly, "but someone's got to do it." She turned and looked him in the eyes. "And what would you have done if you had been in my place?"

Red looked at her, looked away, and shrugged. "The same, probably."

"Someone was trying to kill me," she continued, almost to herself. "And I didn't even know why. So I kept digging and digging until I found out what

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

it was they thought I knew. And you know what's funny?"

"No, what?"

"If they had left me alone, I would never have stumbled onto their dirty little secret."

Red was not so sure. "Maybe. Maybe not. Genevieve Weil isn't very smart, and she panics easily. But let me ask you something: What would *you* have done about Sarah Beaumont if you had been in *Their* place?"

She scowled. "I would never have been in Their place."

"That's not a fair answer."

"That wasn't a fair question! I can no more imagine myself in their place than I could imagine myself in the Klan."

"Still, you've got to admit They had legitimate fears."

"What? That people would find out how They've been secretly manipulating the course of history? So were your people. You were doing pretty much the same thing with your 'cliology,' your 'science of history'; but *you* didn't try to kill me."

Red grimaced and looked at the ground. Absently, he rubbed his wounded arm. "No, we're much crueler than that."

"Yeah, destroy my reputation. Who told the world it was *me* who spilled the beans? I dumped those files anonymously, so someone must have leaked my name to the media. Now they mock the messenger so people won't listen to the message. It's an old tactic."

"It works. How do you think it got to be so old? Dammit, that part of it is for *our* good! I don't fancy being lynched any more than They do. Why shouldn't we squelch your message?"

"Because it's the truth!"

He shrugged and didn't bother to answer her.

"And because it's futile!" she insisted. "I don't care how many 'moles' you have planted in newsrooms and police agencies. You can't stop the message completely. That computer program I wrote will keep on dumping copies of your files—and Their files—until someone figures out how to kill it. Too many people will have a chance to read them. For every hundred who laugh, there'll be one who wonders. And don't forget the businessmen and politicians."

He looked at her in surprise. "Why them?"

"Think of their pride! Think how long they've believed that *they* were pulling the strings. They won't like the thought that they're just variables in your cliological equations."

Red smiled thinly. "Less than that, really. Epiphenomena of the mid-structure. Haven't you been attending orientation classes?"

Sarah made a sour face and Red laughed.

"Aaron's quite a character, all right. He's a thousand years older than anybody. He's seen it all and done it twice. I remember when I was recruited . . ." He saw the guarded look cross her face and reminded himself that she was not fully recruited even yet. ". . . when I was recruited, he was already as old as Methusalah. Story was, he was one of the Founders who'd stuck around to see that the Plan was carried out." He chuckled.

"You're avoiding my point."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"You have a point?" He kept a cheerful-looking smile on his face and showed it to her.

"Yes. Even if only one person in a hundred decides to follow up on what was in my worm, that's still thousands of people, all around the country. Trying to stomp on me is *useless*. It won't change a damned thing!"

"Maybe not. But if you were bleeding from a fatal wound, wouldn't you try to staunch the blood anyway? Living systems defend themselves. Didn't I tell you that one time? It's an automatic response, not hate, or vengence. At least, not on Our part. When you wrote that program, you didn't know about Us. All you knew was that They were trying to kill you. That They had killed others, including some of your friends. You're a living system, too—"

"Thanks."

"—and We don't blame you for defending yourself, either. So We'll discredit your message, destroy your reputation. Sorry, but We'll give you a new reputation in compensation."

"Yeah, such a deal."

"It is a deal. A better one than most people get. Look, what is it you want most of all, right now?"

"My old life back."

Almost, that stopped him; her voice was filled with such longing. He found he couldn't look her in the eye. "You can't have that. You decided that the moment you decided to run that worm. Ask for something else."

"All right. I want to destroy Them. I want to find Dennis and I want to make Them hurt for what They did to us."

Red nodded. "OK. That's what I want, too. You know that. Why can't you join Us?"

She shook her head. "I don't approve of your methods."

"You know what They're trying to do to people, don't you? I told you that, didn't I?"

"Oh, sure. They're trying to domesticate us. Simplify us. Turn us into nice little technopeasants. Docile enough to take orders and educated enough to follow them."

He heard the bitterness in her voice and wondered how she could not have picked sides. "Don't you want to fight that? I do. That's why I've started my own group within the Associates. We've got to get off our kiesters and start fighting. Forget Quinn's Rule."

"The ends justify the means, eh?"

"Don't they? Do you want people to be domesticated?"

"No, dammit! But don't you see, Red? The means have become the end! Why do they want to domesticate us in the first place? To make us more predictable for their equations; to make us more receptive to their manipulations. To simplify Their goddamned arithmetic! If you and your group start down the same path, how long before you adopt the same goals?"

"One hundred and twenty years," he told her. "Plus or minus eight years."

She stared at him. "I don't know you," she said.

We don't know ourselves, he thought. *I shouldn't shoot from the lip so much. Not with her, and not about this.* She was right, though, about the means becoming the end. That was why he wanted her so badly. She had insight.

"I'm sorry," he told her. "I didn't

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

mean to sound so flippant. What I meant to say was that We've got to start fighting Them *now*. The danger you mentioned is real, but it's also more remote. We have more time to work on it."

She shook her head once more. "No, it's more than just that. It's the whole notion of trying to manipulate people—"

"That again? You know, I'd agree with you if you could show me how cliology is different from what people try to do every day, using nothing more than guesswork and intuition. Is it our success you hold against us? Tell me how we differ from the official government, or an advertising agency, or the NAACP. Doesn't everyone try to propagandize the views that they believe in? Is our crime that we have more foresight or that we work out the consequences more carefully?" He didn't know if Sarah were just being stubborn or if she really couldn't see it. The future was a branching tree of possibilities, and the decisions being made today would prune off branches years ahead, closing off some possibilities, opening up others. Sometimes the action that seemed the wisest course at the moment, became monumental folly in retrospect. It was more than important; it was vital to know which branches we might inadvertently prune. *And those of us who can see farther ahead have the duty to guide the rest in the right direction. Don't we?*

Sarah was silent, staring morosely at the horses. Finally she sighed. "If I do decide to join you," she said without looking at him, "will you help me find Dennis?"

Sarah was an impossible woman. Why couldn't she be grateful for coming out of the affair with a whole skin? Which was more than he had. He rubbed his fingers across the bandages and felt the abused flesh and muscles twinge. He remembered the way the shot had thrown him back against the broken wall. *I was lucky*. Memories of that time in Jacksonville; only things had worked out differently then. He didn't want to think about Jacksonville. *She saved my life. I owe her for that.* The Chinese would say I was her slave now.

"No," he said; and she looked at him in surprise. "No," he repeated. "I'll help you find Dennis whether you join Us or not." He waited for her to say something; grew uncomfortable under her gaze. "I'll not have a Sister join through coercion," he explained. "I'll not have you with me except through your own free will. You may choose the new identity or not. You may choose to join us or not. Those are both your choices. But I will help you locate Dennis. That is between you and me."

He turned from her gaze. *I sound like a pompous fool.* He hoped she would not laugh at him.

She didn't. She shook her head in wonder. "I don't know you at all," she said again.

"Are they treating you all right?" he asked after a while.

Sarah shrugged. "I can't complain."

"Sure you could. It just wouldn't make any difference."

She was silent and Red wondered what was going through her head. Then she sighed. "No, it wouldn't." She touched him gently on the arm. "How's the shoulder?"

"Better, thanks. A little stiff." He moved it experimentally. "The cast will

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

be coming off soon. But I'll never play the violin again." She shot him a look of surprise. "Not that I ever could before," he added with a straight face.

Sarah snorted. She watched the horses with him. One of the mares broke from the herd and galloped across the rolling meadow. Red watched her run, enjoying the beauty of her; the way the legs danced and the muscles worked beneath the tawny skin. The stallion charged after the errant mare, nipping at her flanks, driving her back into the herd. Red glanced down at Sarah and had a sudden impulse to whip her hat off and tousle her hair. *I wonder how she would react if I did?* He shaded his eyes and looked at the sky. Overhead an eagle circled. *Shit. I'd probably lose my balance and fall, and how would* that *look?*

Sarah pointed at the mares. "Why do you suppose they do that?"

He looked at her, at the mares. "Do what?"

"With this whole wide meadow to choose from, why do they stick their necks out through the fence to nibble the grass on the other side?"

He shrugged. "Maybe it really is greener. How would I know? I don't know anything about farms."

"Ranches," she corrected him. "You don't know anything about ranches. Neither do I, but I think I know the reason."

"Oh? And what is that?"

"Maybe they just don't like fences."

II

"It's nine o'clock, Brother Malone. Don't you think it's time to hang 'em up?"

Red looked up from his reading and saw Janie Hatch hovering over him. He marked an entry on the computer printout with a fluorescent marker; folded the sheet once through the middle; then capped the marker and laid it aside. "Nine o'clock already? Time sure flies when you're having fun."

Janie snorted and pulled a chair from beneath the neighboring table. She turned it backward and straddled it. "Library's about t' close," she announced.

"I just finished the file." He pointed at the printout, wondering what was on Janie's mind. What had brought her to the library sublevel?

"You know it ain't like you're the only one checking through the Dump. We each got assigned a block to check."

"I know that."

"Then why in tarnation are you going through the whole thing?"

Red grinned at her. "Light reading," he said. "Helps me sleep at night."

She snorted again. "It don't help nobody else. Keeps me awake, wondering what your little buddy spilled to the world."

"She didn't know what she was doing when she wrote that worm. She didn't know she would put us in danger."

"Or she didn't care. Don't get so consarned defensive, Malone. I ain't blaming her. But that ain't the point. The point is to read the Dump careful-like, so we'll know what critical information got Dumped. You try to read too much of it, you git tired. You git too tired, you might miss something."

"I won't miss anything."

"You're a stubborn jackass, Red. How would you know if you missed anything or not?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"You're right," he said, "I think I will pack it in."

He started to rise from the table but Janie put a hand on his arm. "It's that Beaumont woman, ain't it? You're doing something for her."

Red looked into the old woman's weathered face. Years of wind and bright sunlight on the open range had narrowed her eyes into a perpetual squint. He could see nothing in them. No hint of emotion. No curiosity. No clue even as to why she had asked the question. "What of it?" he said. "Quinn's Rules allow private projects. Sarah wanted to know if there was anything in the Dump about her architect friend."

"The one that vanished from the hospital?"

"That's the one."

Janie regarded him silently for a moment. "All right. I'll tell Tex to pass the word along to the others to watch for anything in their blocks. What was his name, French?"

Red felt surprise. "Yes. Dennis French. He was at Porter Memorial." He toyed for a moment with his marker. "Why are you doing this?"

"Doing what?"

"Helping me help Sarah."

The ranch manager shrugged. "Anything we learn about Them is worthwhile. Why'd They bother kidnapping French after They just tried to kill him? Don't make no sense to me. And you shoulda seen the mess his apartment was in, the day I went over there. They fair to tore it apart a'fore I got there." She gave him a steady gaze. "Like They was looking for something."

He returned her gaze. "I wonder what."

She held his for a moment longer, then released him, muttering under her breath, "Only the mountains last forever."

Red figured it was time to leave so he rose, stuffed the computer printouts into his briefcase, and laid the sheet he had folded carefully on top. Then he closed the briefcase and pushed the snaps shut. He felt Janie's eyes on him the whole time.

"Do you know Mark Lopez?"

Red turned in surprise at the unexpected twist of subject. "Who?"

"Our station chief in San Diego. He just sent us that new recruit, Howard."

He shook his head. "I know who you mean. I never met him."

"You may never git the chance. Tex found his name and address in his block of the Dump. In clear. The Council has tried to contact him, to warn him; but no luck so far."

He felt a shiver of fear. Was it starting already? The mob reaction. The mad vengeance. What other names were in the Dump? What other deadly information? "Was there anything in the news?" he asked.

"You mean about a riot?" She shook her head. "They're doing a good job of suppressing interest in the Dump. But there's bound to be them as wonder. Could be the CIA got him stashed away somewhere."

He felt uneasy. Was Janie trying to ask him for a favor? "I could go back to Washington and see what I can dig up. If one of the Agencies has him, I may be able to find out."

"You ain't going anywhere, Red.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Not 'till we know your name ain't in the Dump, too."

That jolted him. He knew it was a possibility, of course. He had been hunting for any mention of his public persona as diligently as he had been for Dennis French or anyone else. He had joked about it with Sarah when he had first gone to see her. "Strung up to the nearest lamppost." A burlesque image, comically grotesque; a parody that insulated one from the reality. Reality was being shot from hiding. Or beaten with fists and baseball bats by an angry mob, delirious with joy that now, at last, they had found a scapegoat for all their troubles. Or simply disappeared, like Lopez, to be questioned with drugs and cattle prods by professionally trained paranoids. Reality was lying a bloody ruin in some back alley, knowing that the pain would only cease when awareness itself ceased. He shivered. He had just gotten a glimpse of what drove Genevieve Weil.

He looked at Janie Hatch. "What about the Ranch? Are we safe here?"

She reached out and gave his briefcase a slap. "That's why we're reading through every line of the Dump."

Red looked carefully into her eyes. He wanted to see fear there; the same fear that he felt. He wanted to see something more than academic interest. But Janie returned his scrutiny coldly. "Jest wanted to let you know, Red," she told him. "If'n you're going to git friendly with her, you should know exactly what she done to Us."

III

"Can any of you cite an example of such a spin-off?" Aaron Gewirtz spun his wheelchair around and braked sharply. He was looking at Norris Bosworth, the one Sarah thought of privately as SuperNerd. Bosworth stammered as he tried to answer.

Aaron had that effect on most of his pupils. Sarah realized full well that Aaron knew exactly who he would call on before he turned his chair; but finding those sightless eyes staring straight at you had an unnerving effect. He had already tripped Sarah up several times.

"Ah . . . Automobile production and the Baby Boom?"

"Are you asking me or telling me?"

"Ah . . . I'm telling you. The spread of automobiles led to significant changes in courtship rituals. The, uh, backseat of the Chevy was a convenient place for, uh, impregnating young women." Bosworth blushed a deep and sincere red. SuperNerd was a gangly adolescent still fighting (and losing) the Battle of the Zits. He had been recruited into the Associates by his uncle. "That was a spin-off," he finished, "totally unexpected by the inventors of the automobile."

"Good. You have the courage of your convictions, however wrong they may be. Would anyone care to . . . Yes, Ms. Howard?"

It was uncanny. Maureen Howard had raised her hand silently; part of her ongoing campaign to fool the blind man. Howard was a plump woman from southern California and dressed habitually in voluminous muumuus and wooden clogs. Sarah thought of her as The Earth Mother. From time to time Sarah had caught her casting venomous looks in her direction.

"Bosworth is wrong," the Earth

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Mother said. "The automobile may have changed breeding practices, but I can't believe that any significant fraction of the Baby Boomers was conceived in that way. The Boom was simply an adjustment to the previous Bust. Birthrates had been low during the previous generation, due to the Great Depression. The pendulum simply swung from one extreme to the other."

Dr. Gewirtz shook his head sadly. "Perhaps it is time for me to retire. I have handled perhaps ten thousand of these orientation classes for my Associates, and each seems more stolid and foolish than its predecessor. Am I losing my touch? Are my words like the seed that fell on the hard ground? Have the birds of the air come and plucked them away? Human behavior, Ms. Howard, results from human decisions. We are not robots. No one consults the statistical abstracts prior to copulation, crying, 'We must procreate more diligently so as to compensate for our parents' lackluster performance!' " The class tittered and he favored them with a harsh glance. There were five recruits in the class. Plus Sarah. "Very well. Mr. Bosworth claims that the changed sexual practices induced by the automobile resulted, through unexpected spin-off, in the Baby Boom of the Fifties and early Sixties. Ms. Howard claims that those changes did not have so large an effect. Which is right; which is wrong?"

"They are both wrong," Sarah said on impulse.

"Ah, Ms. Beaumont! The Sphinx speaks at last. Enlighten us with your too infrequent wisdom."

"*Did* the automobile change the sexual habits of teenagers?"

"Ah, very good! You answer me with a question; but—you will pardon the pun—a pregnant question. I am an old man. My father drove a buckboard. I am sure you all know what a buckboard is. Do I need to enlighten any of you on that point? Good. My father told me how he and his friends would 'spark the gals' in the backs of their buckboards and how many an early marriage or 'late-in-life baby' resulted from it." He paused and a smile chased itself across his face.

"Perhaps I should explain that, in less enlightened times, a baby born out of wedlock was considered a mark of shame. Quite often, the mother would take her errant daughter on an extended trip and return pretending the baby was her own." He waved a hand negligently. "No one was deceived, but the forms had to be observed. The buckboard, in fact, possessed a singular advantage over the automobile. Since it was pulled by an animal somewhat more intelligent than those it transported, there was no need to 'park' in order to accomplish one's intentions. Going back further, we find, by way of example, that the *Geburtsbüchen* of 18th century Rhineland parishes possessed printed columns labelled 'legitimate' and 'illegitimate,' in order to facilitate the recording of teenage indiscretions. It seems likely, therefore, that these sexual practices have not become more common so much as they have become more public. A trend which I deplore, primarily on the grounds of good taste. However—" He turned his wheelchair around and faced the projection screen. "Let us return to my original question. The equations that I've written imply that

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

chain reactions within a society may entrain results unanticipated by those who initiated the action. This is especially the case when there are significant time lags between stages. When the system has, as we say, high viscosity. Again: Can anyone cite an example of such a spin-off? Let us make it more challenging—since such examples abound for those with the wit to see them. Can anyone cite an example which includes Mr. Bosworth's Baby Boom?''

Sarah sighed, closed her eyes, and raised her hand.

''Ms. Beaumont?''

She opened her eyes and saw that Dr. Gewirtz had not even bothered to turn around. How *did* he know who to call on? ''The Baby Boom,'' she heard herself say, ''was an unexpected spin-off, but of the GI Bill, not the automobile.''

Gewirtz turned and the sightless eyes bored into her. ''Explain.''

She stuck her chin out and answered in a confident voice. ''People do not copulate with one eye on the birth trends; but they do with one eye on their pocketbook.''

''Their pocketbook? Ah, you must mean their resources. You really must learn to speak more precisely. Explain, please.''

Sarah flushed. Aaron Gewirtz was impartial and freehanded with his sarcasm, but she thought he aimed his barbs especially at her. She gathered herself and spoke. ''The human breeding strategy is to raise the largest number of affordable children. Qualitatively, we might say that parents divide their net resources—whatever is not needed to sustain their own position in life—by the cost of rearing a child in that niche.'' She waited patiently. She thought she was on firm ground, since she was simply reciting material from the text. She didn't know if she agreed with it—it seemed simplistic—but you couldn't go too far wrong parroting the book.

Gewritz made an exaggerated shiver. ''Your answer, Ms. Beaumont, seems cold, inhuman. People base their family size on their finances! Consciously? What about love, passion, romance? Is there no room in your world for human feelings?''

Sarah wondered how the textbook had become ''her'' world. There was nothing for it but to plunge ahead. ''No, sir. Not always. Not always consciously. And love and passion are there, at least when the couples are young. Yet, though there are always exceptions, wealthier people generally have smaller families; and poor people, larger. Statistical causality is an attribute of the system, not of the individuals within the system. We can draw the parallel with tobacco and cancer. What is clear cause and effect for the entire population is only a probability for a particular individual.''

Dr. Gerwitz pantomimed surprise. ''What? Wealthier people have *smaller* families? Are you sure of your theory, Ms. Beaumont? Surely, if finance and resources were the root cause behind family size, poor people would have fewer children.''

That one she could answer from personal experience. ''No, sir,'' she told him. ''Because it isn't a matter of gross resources, but net resources relative to the costs of child rearing. It simply doesn't cost that much to raise a child

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in poverty," she finished bitterly. *No, Sarah, you cannot have a new dress. Mama will let down the hem on your old one; it still has months of life in it.*

"And how does the GI Bill fit in?" Dr. Gerwitz's face was expressionless, giving her no clue as to whether she was on the right track or not.

Now she was not in the textbook. It was a question of applying the principle to the situation, to see if it worked. "Well . . . It costs more—in time and energy—to raise an urban child than a rural child; so city birthrates are always lower than country birthrates, other factors being equal. Another kid around the farm can contribute to income, come planting and harvesting; but another kid in the city doesn't help mom or dad in the office or factory. So, as the country urbanized, the birth rate declined. That trend goes back at least to 1820. Then, after World War II, the GI Bill subsidized the costs of modern urban life for a significant fraction of the population. Veterans' preferences made it cheaper and easier to buy a home, to secure a job, to go to school. Since that reduced the 'cut' the parents needed for themselves, it increased the residual available for child-rearing."

"Very good, Ms. Beaumont. Someone, I see, has actually read the assignment and thought through the implications." He bowed slightly to her. "If you would be so kind as to reduce your thoughts to the poor and clumsy medium of mathematics, your classmates and myself would be eternally grateful. Your transcript shows that you possess a sufficient mathematical background. Be sure to include intangibles in your formulation of costs and benefits. What is the value of an infant's smile? Many a mother—or father, for that matter!—would sacrifice much for such a payment. Show also how the process leaves room for free will, in the form of a probability distribution around the expected value generated by your equations. Use your equations to postdict past birthrates with a standard error of no more than 0.5% for any one year. We will expect your report in, let us say, two weeks."

Sarah sighed and nodded. "Yes, sir." It didn't do any good to answer correctly or incorrectly. Dr. Gewirtz handed out the assignments with cavalier impartiality.

"If we were to summarize the substance of today's discussion," Doctor Gewirtz told the class, "it would be a quotation from those wise philosophers, Gilbert and Sullivan:

'Things are seldom as they seem;
Skim milk masquerades as cream.' "

Sarah found Red Malone waiting for her outside the door when Dr. Gewirtz dismissed the group. He was leaning against the wall, his good arm crossed over his sling, whistling a tuneless ditty.

"Carry your books for you," he offered.

Sarah made a face. "What, you with your arm in a sling? Don't be silly."

He looked hurt. "I'm not an invalid. I'll go halfsies with you."

"Oh, all right." She handed him one of the thick ringbinders that they used for textbooks. He juggled it under his good arm and walked her down the hall.

"Are you sparking me?" she asked suddenly.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"What?" He stared at her. "Sparking?" He looked puzzled.

"Never mind."

"Hunh. How do you like orientation class?"

She rolled her eyes at him. "Lord God, Red. I swear I've never studied so much so hard in so short a time as I have for these classes. Is it always like that?"

"No, I think Aaron is taking it easy on you because you started late."

She snorted. Red would never die from an overdose of seriousness. Still, she reflected, the enormous interdisciplinary reading schedule she had been given had kept her occupied for the past several weeks and had generally kept her mind off her problems. She wondered if, in part, that might not be the reason why she was in the classes in the first place. Strictly speaking, she was not yet a "recruit." Yet, regardless of the reason why they had asked her to attend, the classes would be valuable. Know thine enemy. She knew people who were "anti-communist" who had never read Karl Marx. People who campaigned against "greedy corporations" who had never studied finance.

Fortunately, she had always had a predilection for learning. Her mind had roamed freely and widely, in school and afterward. Her classmates had always been "bored" with school. But that was a positive feedback loop. A spiral that led steadily downward into apathy and oblivion. The less you knew, the more boring the world became. Learning was always more fun.

Well, maybe not always. Lately, she had learned things that made life distinctly less fun. But not boring. No, certainly not more boring.

"Tex Bodean," Red told her, "and some of the boys went down to the Widener Building last week to clean it out. You'll never guess what they found."

"That's right. I never will. So why don't you just tell me?"

He gave her a quizzical look, then cocked his head. "Inside one of the desks."

"School books. McGuffey's Readers. Randall Carson's dirty French postcards. Can I stop guessing now?"

"A body."

A prickling up the back of her neck. She jerked to a stop. "A body? Who?" For a moment, the thought that it might be Dennis paralyzed her.

"Who? We wish we knew. It was just a skeleton. Very old, maybe a century. It had a nice round hole right here. . . ." He touched his forehead. "And a much larger, irregular hole here. . . ." And he patted himself on the back of the head.

She shivered and hugged herself. "How did it happen?" She remembered the dreadful feeling she had had the evening she had discovered the hidden room. The horrid notion that someone was in the room with her in the dark, just beyond the shadows of her flashlight.

"How?" Red shrugged. "Carson shut down those old offices in a big hurry. There was a lot of confusion. Weil's goons had tracked them down. The skeleton might be one of Them, someone who found the room; or it might be one of Ours, defending the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

place. What does it matter now? Everybody who was there is dead."

They walked along in silence until they reached the elevator. The Ranch was a safe house that the Associates kept for training purposes and for hiding people that needing hiding. Above ground, it looked like a simple, wooden ranch building; but the underground was honeycombed with tunnels and hidden rooms. Sarah had been billeted in a suite on the third sublevel. Along the way to the elevator, she was given neutral stares by a number of passers-by.

"They don't like me here, do they?" she asked as the elevator door closed on them. For the past few weeks she had felt uneasy, surrounded by people who, if not exactly her enemies, were not precisely her friends, either.

"Should they? You've upset their cosy little world, after all. We've been getting rich these past hundred years, from Our preknowledge of historical trends. We haven't done any harm; not like Them. Yet, because of you, We've been exposed to King Mob. Why do you think I haven't gone back to my post in Washington? The official excuse is I broke my arm in a fall from a horse, and there's a dummy entry in Denver General Hospital's files to prove it. But the real reason is that some of my, ah, colleagues might be a tad suspicious of me if they've seen my cover name in your computer Dump."

"Maybe the Associates haven't done anyone any harm," she said, "but you haven't done anyone any good, either."

"Ye are lukewarm," Red quoted. "Ye runneth neither hot nor cold and therefore I spew ye forth from my mouth."

"Something like that."

The elevator dinged and opened on the third floor. They stepped out into the hallway and the doors closed behind them. "Do *you* hate me?" Sarah asked suddenly. "For exposing the Society and the Associates, I mean."

Red looked thoughtful. "Hate? No. You did what you thought you had to do in self-defense. I can't hate a Living System for performing a natural function."

Sarah felt like punching him. Living System! She would show him a living system performing a natural function!

"But," Red continued, "Don't forget that when They tried to have you killed, They were another Living System, also acting in what They thought was self-defense. No, I guess I feel exasperated."

"Exasperated?"

"Yes. You see, I'm used to analyzing spin-offs before initiating action. Taking action can have unexpected consequences. Wasn't that the subject of Aaron's lecture today? Well, you didn't. Analyze spin-off, I mean. After all, when you wrote that worm to strike back at the Society, you didn't intend to vandalize any synagogues."

She stopped dead in her tracks and stared at him. Red walked several paces ahead of her before he realized it. He turned and looked at her "What are you talking about?" she asked him.

"Have you ever noticed how a story or rumor changes as it spreads from person to person? Memetic drift, due to random mutations."

"Get to the point!"

"You started a story, with your computer dump. A lot of people received

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

—and read—those printouts. A lot of other people heard something *about* what was on them; and still others heard about hearing about it. Understand? There are an awful lot of people out there today who have heard only vague rumors about a secret cabal controlling the course of history. Who? Why, the Jews, of course. Or the Masons. Or the Vatican. Or the Rosicrucians. Or the Trilateral Commission. You can fill in your favorite whipping boy. The news today reported several synagogues in the northwest and the south vandalized by neoNazis and Klansmen. Phone calls to TV stations made it clear it had been done to 'strike back at the cabal.' "

"No! That's not right at all! I never said that! Look at me. I'd be the last to encourage anyone on the far right."

"I know. But it's dat ol' debbil Spin Off. It's why Brady Quinn laid down the Law a hundred years ago. Study, but take no direct action. Even when you want to do good, you can wind up doing harm."

"But then, why do you—"

They had reached the door to her suite. Red handed her book back to her. Then, unexpectedly, he put his good arm around her and hugged her. He brought his lips to her cheek but, instead of kissing her, he whispered. "Meet me tonight. Nine o'clock, at the horse corral." Then he left her and retreated down the hall.

Sarah looked after him until he disappeared into the elevator. Then she raised her hand and touched her cheek, where Red had not kissed her.

IV

Sarah found Red by the horse corral. The summer Sun was just setting and the western sky behind him was a burst of color. The clouds drifted in echelon, low in the sky, seeming just to graze the peaks above the ranch. The tops of the clouds were dark and grey with the coming night, but the bottoms glowed orange from sunlight beyond the horizon. A flock of birds—Sarah couldn't tell what sort—took wing and flew across the scene. •

Sarah was amused to see that Red had finally abandoned his Eastern garb in favor of more sensible Western clothing. On Red, though, the Stetson looked incongruous, like a bow tie on a gas pump.

"Howdy, pardner," she said.

"Pardner," Red grunted. "You really get into this scene, don't you? The West. Cowboys, horses, mountains."

"Don't you? No, of course not. You don't even realize you're sitting with your back to the sunset."

Red twisted his head and looked at the clouds. "Nice."

She shook her head. "Nice, he says. You're a philistine, Red. You'll never see anything like that back East. I never did when I was a kid."

It was too dim to see his face clearly, but she thought she heard surprise in his voice. "I thought you grew up in Chicago."

"I did."

"Chicago isn't in the East."

"Really? Which way is it? Point."

Red's arm stuck out.

"What direction are you pointing?"

"East."

"I rest my case."

Red sighed heavily. "All right, but I still don't get it. You're not from here.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

You're a city girl. What makes you so much at home?"

"I'm still a city girl most of the time. Denver isn't such a small town. It just isn't a sprawling *mass* like most of those Eastern cities. Sure, I grew up in Chicago. I knew every alley and hideyhole on the South Side. But this is home for me, now. I knew it when I first laid eyes on it."

Red glanced at his watch, she could see the numbers glowing faintly on his dial. It was, she noticed, an old fashioned analog watch. "Tell me about it," he said.

She shrugged and stuffed her hands into her jeans pockets. "There isn't much to tell, not really. One day I just walked into my job at the *Trib* and told 'em I quit. Quit cold. I had no plans; no new job waiting for me anywhere. But Chicago was getting to me, closing in. I wanted . . . I didn't know then what I wanted. Something different. Wider horizons, maybe. A break with the past."

"Most young girls would have headed for New York."

"And Broadway. Yes, I know. But I wanted substance, not glitz. Besides, New York is just a bigger Chicago. A middle-class Calcutta. It's dirty and rundown and unbelievably primitive. People actually throw trash out in the streets." She shook her head. "No. I tossed everything I owned in the back of my old Chevy and headed for the Interstate. I didn't really have any notion of where I was headed. Just out of Chicago. I went south on the Dan Ryan and, when I came to the turnoff for the Skyway, I went west instead of east. Well, then I kept turning west and before I knew it I was on I-80, heading God-knew-where. . . ."

She paused and sat on the lower fence rail, bent way over, her knees pressed against her chest. She leaned out and pulled a stem of grass from the ground and began tugging and tearing at the leaves. "I drove through Illinois and Iowa and the flatlands of Nebraska without really seeing them. All along the way I kept asking myself if I was doing the right thing and telling myself that I was being stupid. On impulse, I took the cutoff onto I-76 and headed for Denver. And then, one day—I think it must have been maybe mid-afternoon —somewhere between Julesburg and Sterling I first saw that magnificent, snow-capped wall of mountains marching across the horizon. 'Purple mountains' majesty.' I never knew what that meant before; but I knew what it meant then. I felt every fiber within me relax, and I knew I was home for the first time in my life."

Red nodded silently. "To each his own," he said after a while. "Me, I couldn't imagine life without the bright lights and action, without the grit and reality."

"Red, between Broadway and the Sangre de Christo Mountains, which is reality and which is fantasy?"

He hopped down from the fence post. "You'll get no argument from me. I never said I had no fantasies." He gathered himself up. "Well, it looks like a nice evening for a walk." Then, in a whisper, he said, "Behind the barn. The others are waiting."

She looked at him quizzically, but he was already ambling off. Others? What was Red up to? Why did he ask me to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

come out here? And why did he ask so secretively?

And why I did I come?

There were three of them behind the barn: SuperNerd and two men she didn't know. They looked at her curiously, indistinct shapes in the dusk. One of the men was middle-aged and somewhat far gone into swivel-chair spread. The other man was younger, flat-stomached and lounged against the barn wall with unself-conscious assurance. He was dressed like a cowhand.

"Well," said Sarah, in a low voice, "who has a cornsilk?"

The older man chuckled, but all she got from the other two were blank looks.

She hunkered down by the wall and pulled a stem of wild grass. She began twisting and knotting it. "You friends of Red?"

There was no answer so she decided the hell with it. She settled in to wait with her own thoughts.

Red appeared a few minutes later, and introduced people around, speaking low and quickly. The older man was Walter Polovsky; the younger was Tex Bodean. He was Janie Hatch's *segundo*. Sarah shook her head. She couldn't believe anyone was really named Tex these days.

Tex and Walter knew each other. They had never met SuperNerd. They had heard of Sarah, and what they had heard hadn't pleased them too much. "I know what you done," said Bodean. "And I suppose that, if'n it'd been me I'da done the same. But I don't expect I gotta like it."

"Never mind that now," said Red. "Listen up. Sarah, here, found a very interesting piece of paper in Carson's old mansion down in Denver. Tell them what you told me, Sarah. About Dennis's List."

The List? Her mind went back to the day on Mount Falcon when Orvid Crayle had caught up with them. She and Red had been talking about this and that, waiting for Janie to come pick them up. The subject of the List had come up. She hadn't thought about it since then, because she hadn't wanted to think about anything connected with Dennis or with that awful day on the mountain. Or Fee, her cat. She had lost Fee that day, and missed him terribly.

So, don't think about that part of it. Just concentrate on the List.

She explained how Dennis and she had come across the handwritten list of events and how the historian at DU had told him that they were turning points of history. Red interrupted to add: "One of the entries was the assassination of Lincoln."

Walter nodded as if that explained a lot. SuperNerd listened eagerly. Tex simply waited. "What else was on the list?" Red prompted her.

"I don't remember. A lot has happened. Let's see . . . Frederick Taylor and his management system. Dewey and his teaching methods. Henry Ford. I remember those names because they were subjects that Dennis and I had talked about. Oh, and Brady Quinn's death, and a couple of others."

"David Belleau? Agatha Penwether?" That was Walter. She told him yes, and he nodded again. He looked a question at Red.

"Sounds like some of Quinn's and Carson's early work, when they were

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

trying to identify what the old Society was up to. That's how We got onto Their plans for a Domesticated Society. So, what's the point? We already know about it. Hell, it was Quinn and Shelton engineered Lincoln's assassination, even before the Schism."

"Tell them what else, Sarah," Red said.

"Well . . ." She wracked her memory, trying to recall fragments of conversation with Dennis. "Teddy Roosevelt being made vice president. Umm. Winfield Scott's military appointments." She saw Walter's head jerk around and Tex stood up, away from the wall. "And, oh yes, Lincoln's election, too. And—"

"What is this, Red?" demanded Tex. "They don't belong on that list!"

"And neither did von Kluck's Turn or the sinking of the *Lusitania,*" said Red

"Hell, those were in Europe and neither group . . ." Tex's voice petered out and he stared at Red. "You mean to say. . . ?"

"At the bottom of the page, Sarah told me, there was a note that read 'Try orthogonal factor analysis.' " He paused and looked around the group. "The entries in the list were numbered with 1s, 2s, and 3s."

"Jesus H. Christ on a Harley," said Tex. It sounded like a prayer, not a curse.

"That's right," said Red. "We know who #1 and #2 are. That's the Old Society and Grosvenor Weil's perversion of it. But who the hell is #3?"

Sarah saw it, too. She laughed and the others looked at her. "All that sweat," she explained, "and all that anxiety to keep your Secret from leaking out. And all along someone else has had it, too! That's rich; that's really rich!"

Walter scowled. "I don't see how it's funny, miss. As if we didn't have enough on our hands fighting Them and pulling the wool over Cam—"

Tex tried to shush him but Sarah laughed again. "Don't worry, Tex. I know all about Red's disagreements with Cam Betancourt. It's obvious you're all part of the cabal within the cabal." She turned and saw the mute appeal in Red's eyes, so she decided to say nothing about her own reservations. Could you really fight evil with evil means? Could you do it without taking on the very attributes of those against whom you struggled?

"And that's not all," Red said. "Can any of you read French?" Sarah told him she could and he reached into his shirt pocket and took out a piece of paper. "Tell me what his says. It's off of a Quebec City node of the DataNet."

Sarah looked at him, then unfolded the paper. She saw it was a sheet of machine paper. A copy of a memo.

"It says," she told them, "that there is a string of suspicious murders that bear looking into. Then it gives a list of names and dates. Jesus, it looks like Morgan's list!"

Red nodded. "I recognized the names."

Walt reached out and took the sheet from Sarah. He studied it while Tex and SuperNerd hung by his shoulders.

Sarah looked at Red. "Quebec?"

Walt looked up. "We don't have a station in Quebec; but They do."

"In Montreal," Tex reminded him. "Not Quebec City." Walt shrugged.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Branch office?"

"Since when do they conduct Business in French?" Red asked.

"It's the Law up there. No official business in English."

"Or look into murders that They committed Themselves?" Sarah said. "Don't fight it, Walt. It looks like my worm picked up one of Number Three's files."

"I've been going through the whole Dump looking for strays," Red explained. "Anything that I couldn't assign to Us or Them. This—" He flicked the sheet with his fingertips. "—is the only one I found. Being in French, it stood out."

Silence fell on them and they looked at one another uneasily. Sarah wondered what they were thinking.

"The question now," said Red, "is: what do we do about it? Do we tell Cam and the others? Do we tell Them? Or do we nose around on our own before deciding what the best course is?"

"Brother Betancourt'll find out soon enough," Tex decided. "Whoever's reviewing the block that the Stray is in will notice it and pass it upstairs."

"Maybe," Red allowed. "But everyone's concentrating on plugging Our own leaks. The checker, whoever it is, may see it; note that it isn't Ours; and not give it any further thought."

"Either way," Walt said, "we should keep quiet. Figure out how this affects our plans. Is Number Three an ally or an enemy?"

"I've got a question," said SuperNerd. They all looked at him. "This third group. We know about them, but do they know about us?"

Walt looked at the printout; then he looked at Sarah. "They sure as hell do now."

SuperNerd rubbed his nose and toyed with a pimple there. "Then time is probably not one of our major resources."

V

Red walked her back to the complex. He walked with his hands stuffed into his jeans. The others had dispersed in their separate ways.

"Five people?" she asked him. "That's your secret cabal?"

He scowled. "Don't be silly. I've got at least twenty-five people. Not everyone is out here, obviously."

"Still, it doesn't seem like you have too many 'assets' to locate a group that's stayed hidden at least as long as you have."

"That wasn't why I organized the group. You know that. But . . ." He shrugged. "We should have thought of it ourselves. Nature keeps no secrets. What one person learns, anyone can learn. Crawford couldn't have been the only one who read Babbage's book."

Silence closed down as they approached the ranch building. Sarah stopped on the porch and looked up at the stars. Somehow it was always the Big Dipper that caught her eye first. She remembered one time camping out above the tree line and gazing up at this same, slowly revolving sky and feeling—really feeling—what an immense distance it was from here to there.

She leaned on the wooden railing that ringed the porch, feeling the cool night breeze. There were animal sounds floating in the distance, muffled by the spruce forest around them. Red coughed and she turned and faced him.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"You're going to hear this tomorrow, but I thought you'd like to hear it from me."

"What?"

He seemed embarrassed. He shuffled his feet. "Your house in Applewood. Somebody broke into it and vandalized it. Smashed everything. Spray-painted the walls. Set fire to the drapes."

She hadn't thought there was anything left in the world that could reach her. Shock after shock had annealed her emotions until they lay numbed and hardened. The close brush with death; the loss of friends; the flight from everything she knew and loved. . . . She closed her eyes and tears forced themselves through. "What?" As if repeating the message would change it. "Why?" She knew why. She opened her eyes and looked at him. He was blurred. "It was Them, wasn't it?"

He shook his head. "No. Just some of the locals in an uproar. From what was painted on the walls, the vandals thought you were the one directing history."

"That's absurd! I'm the whistleblower, remember?"

"You know that and I know that but you also know how information gets distorted as it spreads."

"Everything?" she said to herself. "The piano?"

"That was smashed. But, no, they didn't get everything. One of Us went down there a couple times over the holiday weekend to save what we could. It was easy to forecast something like this would happen."

"Easy to fore—?" She turned on him and stood with her arms stiff at her sides, her hands curled into fists. "Then why didn't you stop it?"

"How? Post armed guards twenty-four hours a day? There was no way."

"Dammit, Red," she said, fighting tears. "I loved that place. It was just right. I picked out each piece for it."

"We've got a piano here. A whole music room."

"That's not the point, Red. It's not *my* piano!"

He scuffed a boot. "I'm sorry. We did what We could. Here." He took her by the arm and led her inside. "I'll show you what we saved." She followed him in a daze, angry with herself for letting the news affect her so. *I thought I was going to be strong from now on.* But there was a limit to the shocks a person could take. When they reached her door, she tried to open it, but somehow she couldn't get the key into the lock. Red took it from her and opened the door.

And she stepped into the past. She stopped and looked around, not believing what she saw. It was all there. The furnishings from her house. Oh, not the piano or the sofa or the drapes. But the wall hangings and the photographs and the lamps and even the big stuffed chair that she sometimes fell asleep in reading. The painting she had done herself fifteen years ago, when she had thought about taking up art. She remembered how it felt to layer the colors onto the canvas. And her books! Conrad, and Trevor, and Block, and Heinlein. Well worn and dog-eared. Faithful companions, all of them. A chime made her turn around; and there was the grandfather's clock behind the door. She gripped it with both hands, like an old friend long lost and stared at her reflec-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tion in the glass, remembering as she did so what she had seen there the last time. Behind her, on the countertop in the kitchenette, she could see the reflection of Fee's food dish.

And that was one piece she didn't want to see. Tears came. She had used her precious Fee to distract Crayle during that terror on the mountaintop. She had thrown her cat into the bushes for a single split-second advantage. It had saved her life and lost her Fee.

Who am I kidding? she thought. *These things don't matter to me. I was never crying over a house and furniture. I was crying over the memories and the struggles that they represent. Everything that brought me to where I was. Everything that I've lost now, forever.* She didn't think she could stand seeing that food dish.

"They found something else on the last trip," said Red, opening the bedroom door.

And Feline P. Cat strutted out, looking regal and arrogant. He hopped to the countertop and attacked his dish.

"Fee!" Sarah rushed to him and hugged him and the cat endured her patiently. "Fee! I looked all over that mountain for you. You ran off. Not that I blame you after the way I treated you." She looked up at Red. "Where'd you find him?"

"Our people found him at your house. After combing Mt. Falcon for three friggin' days. He'd gotten in through the cat-door, and boy, was he a mess. So was the litter box." He shook his head. "Found his way back, somehow. I've heard of dogs doing that, but never a cat." He edged toward the door. "I'll leave the two of you to get reacquainted."

"Red Malone! Hold it right there, sucker!" Red froze in the door and Sarah stuck a finger at him. "My house must have been under pretty frequent surveilance. Neighbors, if no one else, would be wondering if I was coming back. Whoever went there to salvage my things before the place could be ransacked was taking a terrible risk. Especially since he had to go back more than once. Whoever it was was a damn fool because none of this is worth his idiot neck. Except Fee." She stroked the cat and heard the familiar purr. "For that, I'll forgive him his stupidity." She looked back at Red. "You wouldn't happen to know the name of whoever it was, would you?"

Red blushed. It was the most amazing thing Sarah had ever seen. His entire face turned a deep crimson that ran down his neck and into his shirt. That was the great thing about white folks. You could tell a lot just from their skin.

"Yeah, I thought so. Why'd you do it, Red?"

He looked at the carpet. "Because we owed it to you."

"Nice try. Try again."

"Because it seemed the right thing to do."

"Better. Once more."

"All right! Because I *wanted* to do it! Me! For my own reasons!"

She picked Fee up and cradled him in her arms. "Now, why would you want to do a fool thing like that?"

"Because I wanted to see you smile, just once before I died."

Her mouth dropped open and she stopped stroking Fee, who twisted in her

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

arms to find out what had happened. "Red, you—"

"And besides, I left my plumber's van at your place."

VI

The next day Sarah decided to ride up into the High Country.

She was walking along the underground corridor toward the elevator, on her way to the orientation class when she thought she heard her name spoken. She stopped and looked around, but there was nobody there. Frowning, she started on her way. Then she heard muffled voices coming from a small side corridor and, becoming curious, she turned into it and looked around.

There was a door on the right-hand wall. It was closed, but there was a vertical glass panel that paralleled it, and, through the panel, she could see men and women seated around a broad mahogany table. She recognized Red (who was not sitting at the table, but was perched on a credenza that ran along the far wall) and Jane Hatch, the old woman who ran the safe house. The others were strangers.

She backed away before anyone noticed her. Then she leaned cautiously forward and put her head close to the door.

". . . make up her damned mind!" (she heard.)

"Give her time. It's not an easy decision." (That was Red's voice.) "We're asking her to erase an entire identity. To become another person. I'm not sure how I would feel about it myself."

"That from a man who keeps a dozen personae! Brother Malone—"

"That's different, Brother Betancourt. Certainly, I maintain several different identifies, but one of them is *me!* I may wear a new persona for a particular op. But when the op is terminated, I can shuck it. We're telling Sarah Beaumont that she can never be Sarah Beaumont again. Ever."

When Sarah heard that, she closed her eyes and hung her head. There was an empty feeling in her upper chest. As if something vital was missing. Red had not been pressing her for a decision on the change of identity, but the issue had not disappeared.

She continued to listen.

". . . know what'd happen if folks outside knew who she was. Not jest Them; but the general public. There's a lot of hoorah going on, and a passle o' folks hold her to blame. This name change, it's for her own good."

"The old argument, Sister Hatch. Do as we say, because we know best."

"We *do* know best!"

"What's that got to do with it? If freedom means anything, it's the freedom to be a damn fool. To do something irrational or even dangerous. To be stubborn and cussed and downright mule-headed. To flip the bird at the inevitable fucking tide of history."

"Like someone else in this room I could name," said Betancourt.

There was a ripple of laughter before Red continued. "Now you know and I know that if she goes on being Sarah Beaumont in public, she will be killed. Maybe by one of Them, for revenge; maybe by some nut case with a fantasy about what she did or didn't do; maybe by Tyler Crayle, if he finds out it was she who did for his brother. It doesn't matter, except maybe to her. The logical

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

thing for her to do is to change her identity. *But who are we to tell her she has to do it?*''

''We're the ones who rescued her. We saved her ass.''

''No, Sister Hatch,'' said a new voice. ''Brother Malone is right. We saved her ass, but we don't own it.''

''Wish I did,'' said another voice, a male.

There was another ripple of laughter and Sarah's ears burned. She wondered who had said that.

''Wait your turn, Al. You'll have to stand in line behind Brother Ma—''

''I think you better close your teeth while you still have them, *Brother* Hollister.''

''I invoke Rule 19!'' That caused more laughter.

Someone banged on the table. ''That will be all, gentlemen, if I may employ the term loosely. Brother Malone is a professional. He will assist our ward in making the right decision, I am sure. Isn't that so?''

Red's reply was slow in coming. ''Yes, that's so. I'll help her make the right decision.''

''Then, if there are no further agenda . . . ?''

Chairs scraped against the floor and Sarah backed hastily away from the door. She returned to the main corridor and scampered to the elevator. She pressed the button and fidgeted, then stabbed it several more times, although she knew rationally that that would not make the machine come any faster.

The overheard meeting preyed on her mind all through Aaron's class. What *should* she do? She had thought that she had severed all her ties to the past years ago, when she had put Chicago in her rearview mirror. But now, when the need came to obliterate them entirely, she found the hand with the scissors shaking. Erasing ''Sarah Beaumont'' and becoming—who? Jane Doe?—was a little too much like dying. It came to her suddenly that she needed to be in wild country with nothing around her but the sky. She needed to be alone with her thoughts. Through the window, she could see the snow-capped peaks of the Front Range and she thought about the tundra and the wildflowers and the krummholz and—

''We are waiting, Ms. Beaumont.''

She jerked her attention back to the class. ''I'm sorry. I wasn't paying attention.''

Gewirtz stared at her with his rheumy, white eyes. ''Is that a fact? I had thought you were perhaps engaged in astral projection.''

''I said I was sorry. Could you repeat the question?''

''The First Rule of Thumb, if you please.''

She sighed and took a deep breath. ''The First Rule of Thumb of Cliology is: Evaluate the action, not the actors. That is, the results, not the intentions.''

''Very well. Can anyone explain the meaning of this rule?'' He scanned the class almost as if he could see them, then stabbed a bony forefinger. ''Mr. Bosworth.''

SuperNerd had been trying to slump down his chair. He jerked up and looked around. ''Ah, only that, uh, direct action seldom achieves its alleged objectives. Sometimes it achieves the exact opposite.''

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Hmph. Is there another sort of opposite, Mr. Bosworth? Never mind. Can anyone cite an example in which the actual results of an action or policy were the 'exact' opposite of the stated intentions? Ms. Beaumont?"

"The attempts by the Babbage Society to preserve the Secret led directly to the exposure of that Secret."

There was a moment of embarrassed silence. SuperNerd looked surprised and nervous. The Earth Mother bridled openly. The others glowered at Sarah.

Slowly, a smile spread across Aaron Geritiz's face. His head bobbed up and down. "A truly creative response, Ms. Beaumont; if a trifle provocative, considering the venue. It does have—shall we say?—exceptional poignancy to those of us here in this room. Being engaged in the inspections of the motes in the eyes of others, we did indeed overlook this particular beam in our own. Alas, one needs more than good intentions in order to accomplish a goal. Are there any further examples?"

The Earth Mother spoke. "American government support for anti-communist dictators led, in 80% of the cases, to communist, or at least anti-American, regimes. Case examples: Cuba, Iran, Nicaragua, Chile, South Africa, Haiti, the Philippines. Only one of those post-revolutionary regimes could be regarded as friendly to American interests."

"Thank you, Ms. Howard. And why do you suppose that is? Ineptitude? Or perhaps secretly pro-communist sympathies in the State Department?"

"The size and strength of the middle class in the countries in question."

"Correct, Ms. Howard." Gewirtz wheeled away from her and spoke of the class at large. "Direct action frequently has the singular drawback of accomplishing its opposite. I refer you to Aesop's fable of the Dog and the Bone. Any engineer could weave tragic tales of the Promising Design that never quite worked in execution. Cultural engineering, whether done intentionally or not, is, if anything, even more difficult than mechanical or electrical engineering. I could cite pedagogical methods that somehow produce less educated students. Or Ms. Howard's example of stroking every cur with an anti-communist bark. Usually, this unfortunate reversal of effect is unintended. It is the blind working out of millions of conflicting free wills, each intent upon its own betterment, colliding and ricocheting in an intricate statistical dance. But, occasionally it is deliberate, the subtle machinations of our friends on the other side. Yes, Mr. Reynolds?"

Reynolds was one of the two other men in the class. Sarah had never particularly noticed him. He was a gray young man with a gray personality.

"I don't understand what the middle class has got to do with whether a country goes communist."

Aaron thinned his lips. "Do you know what the middle class is, Mr. Reynolds?" he asked testily.

"Sure. It's the ordinary joes, like you and me. You know, not rich, but not poor."

"An inadequate description, Mr. Reynolds! One rife with hidden assumptions. I am not at all sure that you and I are 'joes' of the same class. Wealth has little to do with middle class status. Some members of that class are

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

quite well off; others are poor. Mr. Bosworth?''

''Uh. The middle class, they were the merchants, the bankers, the lawyers—''

A pained expression crossed Gerwitz's face. ''Do you intend to define the class extensively, through an endless recitation of occupations? I shall provide you with a hint. In an agricultural society, there are only two classes of importance. What are they?''

''Uh, the land owners and the land workers. Lords and serfs.''

''Most astute, Mr. Bosworth. You will present us with a paper, using the calculus of diffusion, showing how such classes arise. Hint: the equations are similar to those describing dispersion of a population over a landscape. Initial conditions: egalitarian agricultural villages; boundary conditions: the usual range of soil fertility and climate plus a minimum caloric level needed to sustain life. Show how the development of classes is inherent in the random variation of crop yields and in the triage concept, given that we possess a sociobiologic tendency toward altruism.'' He wheeled his chair around to Reynolds.

''Nor have I forgotten you, Mr. Reynolds. Your assignment shall be to analyze the emergence of the middle classes—note my use of the plural form!—and show how it was inherent in the evolution of industrial society. Use the algebra of analogic to compare the industrial, 'middle' classes with their agricultural predecessors. Analyze the course of the Modern Revolution in the following categories of countries. Category 1: England, France and the United States. Category 2: Germany and Italy. Category 3: Russia and China. For each category, compare the outcome of the Revolution with the relative size and power of the middle classes *vis à vis* the aristocracy.''

''Wait a minute! We never had aristocrats and serfs in this country!''

''No? I am sure Ms. Beaumont's ancestors would be pleased and comforted to learn that. I submit to you that the Revolution in this country climaxed at Appomattox, not at Yorktown. True, the plantation owners of the South bore no elaborate titles. They were not styled 'Duke of Roanoke' nor 'Baron of Selma.' They were called only 'Massah.' But they needed no other title. They constituted less than 4 percent of the white population of the South, yet controlled virtually all the wealth. They were land lords no less so than those of Europe.''

Sarah paid only half a mind to the discussion. The answers were straight out of the text. The middle class in nations of the first category had been powerful enough to win armed conflicts against their upper classes, creating free enterprise capitalism and parliamentary democracy. Where the middle class was not so strong, the aristocracy co-opted the middle classes and modernized from the top down, developing sham parliaments and finally Fascist states. In Category 3 states, the middle class was weak, or even non-existent. In their desperation to modernize, the aristocracy created imitation bourgeoisie, called *intelligentsia* by Tsar Peter. But artificial bourgeoisie never quite match the accomplishments of natural evolution. Ultimately, the forces of modernization exploded from the lower classes, the workers and the peasants, leading to communist dictatorships. Which was

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

why propping up feudal aristocracies in banana republics always seemed to backfire.

As the class droned on Sarah became aware of a new sound. It was faint and squeaking and seemed to be coming from the heat vent. She frowned in puzzlement. The sound bordered just on the edge of familiarity, but on the wrong side of the edge. It swept up and down in pitch several times then stopped abruptly. After a pause it began again. It repeated this cycle several times while she listened.

All of a sudden, it came into focus. It was the clarinet solo from *High Society*. Someone was practicing the racing cadenzas over and over again, tripping up each time on the syncopations in the high register. Yet whoever it was was patient and determined. She realized that the sound had been going on for some time before she had become fully aware of it.

"Ms. Beaumont!" Sarah started, like a child caught with her hand in the cookie jar. Aaron Gewirtz had swung his chair to face her again. "Once again, I have asked you a question without obtaining gratification. If you do not know the answer, please say so, so that one of your classmates may experience the benefit of my scrutiny instead."

"Oh. I'm sorry doctor. Could you repeat the question?"

"I could but I shall not. Instead, you will prepare an essay for our education in which you will demonstrate that the middle class origins of revolutionary leaders and thinkers is a necessary result of continued population growth. Adduce whichever cases seem relevant; but do not ignore those which might seem to contraindicate your conclusion."

She tightened the cinch on the saddle while Red looked on unhappily.

"You *are* coming back, aren't you?"

"Of course I'm coming back. I just need to be alone for a while. Somewhere where I can think things through. My whole life is going to be different from now on. I need to decide how much different, and in what ways."

Red handed her the bedroll and saddlebags. "I could get in big trouble for this, you know."

She tied the baggage down. "No you won't. Sure, all us 'recruits' are supposed to be incommunicado; but we've all taken short rides in the mountains before now."

"This isn't exactly a short ride you're planning."

"No, it's not. But I'm not going to make this decision under pressure, yours or anyone else's, or on the spur of the moment."

Red scuffed a boot in the dirt and straw of the stable. "You going to be OK up there? I mean, do you have everything you need?"

Sarah patted the horse on the neck and the horse whuffed in reply. It was a grulla mountain horse, mouse-colored and sure-footed. She had fallen in love with it the first time she had walked through the stables. "Don't worry about me. Everything I really need, I carry up here." She tapped her head. "The stuff we salvaged when we went back for my car is just bonus."

"You don't need food?"

"No, there's plenty of food up there. You just have to know how to shop for

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

it. I'm only packing a little jerky and some coffee."

"Janie said you could have some things from the kitchen."

Sarah shook her head. Red was like a mother hen. "What does Janie think of my little excursion?"

"She thinks you're nuts. She says there's only one sane choice."

"Easy for her to say. It's not her identity you're talking about erasing."

Red grunted something in reply. She led the grulla from the stable out to the corral. The day was cool. The sun was hiding behind occasional clouds and a fresh wind was blowing from the west. Sarah paused before mounting, twisting the reins in her hands. She looked at Red. "Well," she said. "Wish me luck."

Red stuck out his hand. "Luck," he replied.

Sarah hesitated a moment, then took the hand. "Thanks." Then she shoved her boot into the stirrup and lifted herself up. Western boots had pointed toes so the foot could enter the stirrup easily, and high heels so it couldn't slip all the way through.

"You know, Quinn did this once himself."

She looked down at him. "What?"

"Rode up into the mountains to be alone. It was just after he came West. He had some soul-searching of his own to do. He stayed up there for several months. Wandered up to Central City and down to the San Juans. Story goes that he built a log cabin with his own hands somewhere around here and lived in it for a while." He looked at her searchingly. "You won't be gone as long as he was, will you?"

She laughed shortly. "No, this is the twentieth century, not the nineteenth. We do things faster nowadays. Even soul-searching." She kicked the horse in the flanks and pulled on the reins. The grulla's head came around and she left the corral at a fast walk. At the edge of the property, she twisted around and looked back at Red. He waved an arm at her and she waved back.

When Beaumont was out of sight, Jane Addams Hatch came out of the kitchen door of the main house and stood on the back porch watching. Her hair was white and her skin tanned. Red turned and saw her there. He walked over and stood beside her.

"She's gone," he said.

"I can see that," the small, wizened woman replied. "She gonna see sense?"

"I think so."

Janie grunted. "*You* gonna see sense?"

Red looked her in the eyes. "What do you mean?"

Janie snorted. "You shook her hand, Red. If'n I was her, I'da let you have one across the chops. Why didn't you kiss her?"

He turned and looked where the horse and rider had vanished into the trees. "She didn't say anything."

"Red Malone, you are a fool! She'll never say anything. Not her. Askin's not her style. An' she may not even know herself what she wants."

"Why, Jane Hatch! Are you trying to interfere with the natural course of history?"

The older woman snorted contemptuously. "I'm jest pulling a few stones blockin' the channel. Ain't nothin' wrong with that."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

* * *

VII

Sarah rested with her back to a tall spruce and chewed thoughtfully on a strip of jerky, listening to the silence. The early morning Sun slanted through the canopy overhead, piercing the forest with individual shafts of light. There was a stand of quaking aspen a little bit off to her left. That was how she'd built the fire to brew her coffee. The aspen is a self-pruning tree and there is always a fall of dead branches underneath one.

Well, it wasn't really silence, she admitted to herself. The trees were always busy from the frequent breezes. Especially the aspen, whose leaves shivered in the slightest breath. But the spruce and firs added their sound, also. The wind soughing through their needles produced a murmur like a distant crowd. Voices always on the verge of intelligibility. If she listened closely enough (or, perhaps, if she did not try to listen, at all) they might tell her something.

Arbormancy, she thought. Divination through the whispers of trees. And what would their advice be, she wondered? What did the forest say about the Associates and cliology and changing her identity? The breeze freshened and tree branches swayed in the wind. "Sssssaraaaaah," they called.

A jay called and flew abruptly from one tree to another, not more than a hundred feet from where she sat. Farther away, something bigger scurried through the brush. A squirrel, maybe, or a porcupine. She took her coffee cup, holding it in both her hands to let the warmth of it work through her, and sipped from it. She glanced at the angle of the sunbeams.

Time to move on.

She poured the rest of the coffee on the fire. Then she carefully stamped all the embers into the ground. She walked to where the grulla had been pinned and retrieved a folding shovel from the saddlepack. Then she dug a hole and buried the fire.

Satisfied that she had left no hazard, she packed up the pot and the jerky, rolled up her bedroll and strapped them and the saddle to her horse. As she was tightening the cinches, she heard a loud report, like a rifle shot. She started and the horse, sensing her fright, jerked on the reins.

She jumped behind a piñon pine and crouched there. She stroked the grulla's neck, speaking soothingly to it, watching the direction from which the shot had come. She held her breath, waiting.

The sound came again, clearer now, and she almost laughed in relief. Not a rifle shot at all, but a seed pod bursting. Some flowering plant preparing for the next spring, spreading its seed as widely as possible before it could die.

"I *really* needed this vacation," she told the horse and the grulla bobbed its head in agreement. She swung herself into the saddle and headed upslope.

Later that day she broke from a stand of Engelmann spruce onto a wide alpine meadow. In the distance, the bare peaks of the continental divide shoved the horizon skyward, like a rocky wave breaking upon the Earth. The bones of the earth, thrust out by an unimaginably ancient collision. They were speckled with patches of snow that never melted. The Never-Summer Mountains, the Utes had called them. Closer in, a mule deer

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

buck raised its head from drinking at a pond and watched her. Sarah reined in and kept still, waiting to see what the deer would do.

The pond was the creation of a beaver family that had blocked the flow of the stream with their stick-and-mud constructions. The backed-up stream was well on its way to covering the meadow. The Arapahoe had a legend that Beaver had built the world. The wily Indians had seen with their own eyes how beavers changed meadows into swamps with their dams. Of all the animals, only beavers and men create their own environments.

And what is the difference between a beaver dam and a human dam? Echoes of the conversation she had had with Red the day of that terrible drive to Mount Falcon. What made one natural and the other not? Only a matter of scale? Of intent? Both change the environment, and not necessarily for the better. Unless you are a beaver. Or a human.

Perhaps the difference lay in the ability to foresee the consequences.

And wasn't that just Red's argument? What do you do when you can foresee consequences that no one else can? Do you sit idly by and rake in the chips, like the Associates; because you know which way the little roulette ball is going to go? Or do you try to make the ball go where you want, like the Society? Or . . .

Or what? What about the Third Force that they had deduced from Dennis's list and the Stray? What was their philosophy? Were they another Society or another Associates, or something else entirely?

That's a lot of metaphysics to find in a beaver's dam, she thought. And how should she answer Red? Red claimed that tampering with the course of history was justified, provided your intentions were good. That everyone did it anyway, blindly and without expertise. That history was nothing but the cumulative blunders of millions of bungling amateurs. How did you answer that? Turn professional? She yanked on the grulla's reins and pulled off to the north. The mule deer, startled by the movement, bolted for the forest.

Valleys lay below her like giants' furrows turned up by a great plow. Some peoples had gazed at the stars of the Big Dipper and called it the Plow. Perhaps they had seen furrows like these. Sharp-sided cuts gouged out by mountain streams as they fell toward the plains far below. Sarah checked her direction against the vegetation. At this altitude, Douglas fir marched on the north slopes and ponderosa pine on the south. The south-facing slopes received more direct sunlight, and hence were drier than the north slopes. Different plants had adapted to each niche. Farther down, the ponderosas moved over to the north slope, while grasses, brush, and prickly pear cactus took over the south.

When she broached treeline onto the alpine tundra, the wind nearly knocked her off her horse and she took a moment to yank her poncho out of the saddlebag. It flapped around her like a banner. She pulled it over her head and cinched it tight. The wind blew constantly up here, often reaching a hundred miles an hour; and nothing stood up tall. Everything hugged the ground to survive in a world that was never frost free and where

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

snowstorms could occur any day of the year. The clouds seemed so close that she could almost reach out and touch them, and they raced across the sky as if chased by demons.

She was on an old Indian trail; probably Ute this high up. She kept to it, obeying the injunction Leave No Footprints. Tundra plants were incredibly hardy, but they were so closely balanced between life and death that the slightest stress could tip the balance against them. This trail might have been untrodden for a century but the vegetation had yet to reclaim it. She blew on her hands to warm them.

The tundra was ablaze with color. The purples and whites of marsh marigolds and Parry primroses. The three-inch golden blooms of the alpine sunflower, which, like the Moslem, always faces east, providing a reliable compass to the traveler. How did the old gag run? There are only two seasons in the High Country: winter and July. She was glad she had come in July.

Here and there, limber pine, bent and twisted by the winds, crouched and hid behind rocks and other shelter. This was the krummholz, twisted wood sculpted into weird dwarf forms, like some sort of natural bonsai garden. It was not an earthly landscape. The cold, thin, high-velocity air. The strange, grotesque vegetation. The rocky, angular horizon.

She began to imagine herself as a star traveler, far from Earth. She had landed on an alien planet. She even named it: Altaflora. It orbited a G-type sun, but one that was hotter than Earth's. On Altaflora, it was possible to freeze and get sunburned at the same time.

A yellow-bellied marmot stood upright amid the flowers and she saluted it, using Spock's Vulcan hand sign. (She had heard somewhere that Leonard Nimoy had learned the gesture in Jewish Brooklyn.) "Take me to your leader," she requested. The marmot continued to look at her and made no attempt to comply. Just as well, she thought. Marmots were anarchists at heart and had no leaders to speak of.

The Altaflorans had a civilization, of course. Underground, away from their harsh climate. There were fabulous cities carved from the permafrost somewhere under her feet. Magic caverns of glowing crystal.

There was a rumble behind her and she twisted in the saddle to look. Dark clouds had gathered around the peaks to the southwest. There was a blur underneath them that meant rain. Lightning crackled, and smashed the boulders on a distant peak, and she could feel the hairs on her neck rise from the static carried on the moist wind. It was time to get back downstairs and into drier climes.

She found a rocky draw that led downslope and turned her back to Altaflora.

VIII

The cabin was made of lodgepole pines. It was old and tumbled down. The roof was gone and the door, dried and cracked, lay amid the wreckage. Sarah circled the place slowly, checking it from every angle. It was old, very old. Was it the one Brady Quinn had built? Red had mentioned it being somewhere in this country.

But there had been mountain men all over this region in the early 1800s and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

some of them probably left cabins behind, too. Yet the place could not be too old, or snow and rot would have done for it. It reminded her a little of the ghost towns she had seen in Summit and Park counties, preserved in a precarious state of mummification. The wood dried and bleached into a kind of fossilization.

She dismounted and drove the grazing pin into the ground so the grulla could wander in a circle and browse.

She leaned inside the doorway. There was a young piñon growing in the center of the cabin, but out the vanished back wall she saw a magnificent bristlecone! She made her way through the wreckage of the cabin and stood by the ancient tree. She reached her hand out to it and ran her fingertips over the rough bark. How old was it, she wondered. A century? Half a millennium? Farther north, on Mount Evans, trees like this one marked the treeline. And some of those were two thousand years old.

That settled it. This was where she would camp and take out her soul and inspect it. The tree was a comfort, an anchor for her into the depths of the planet's history. While she sat in its shade she knew she could never lose her bearings.

She turned back to the doorway and saw the markings on the inner wall of the cabin. She ran her fingers along them. Tally marks. Someone had once kept track of the passing days. Her fingers encountered something hard buried partly in the wood. She pulled her knife from its sheath at her belt and worried at it until it fell into her palm.

It was a stone arrowhead. Ute? Arapahoe? In the movies, the scout or mountain man always knew the difference. She inspected the point closely. There was no way of telling, so far as she could see.

She turned it this way and that, imagining what might have happened; and for just an instant, she *felt* the history of the place. Only a thin veil of years hung between her and what had once happened here. The lone camper or trapper in a land he thought of as empty wilderness. The Indians, fearful and uncertain of the intrusion on hunting grounds which *they* saw as crowded. The attack. The fight. Arrows cutting the air. The answering barks of the rifle. Flintlock? Maybe. How had it ended? With the Indians fled, or the white man dead?

And who said it had been a white man! Jim Beckwourth, the mountain man, had been a black—and a founder of Pueblo, Colorado, as well! And later on there was Bill Pickett, "the greatest sweat-and-dirt cowhand that ever lived." From the beginning to the end, the West had swarmed with black men and women. So, as long as she was fantasizing, she could fantasize a black man defending this place.

She set up camp in the ruins of the old cabin, well away from the bristlecone. She cleared away the old wood and built herself a stone circle to hold in the fire. During the day, she wandered the rocks and canyons, exploring. She found a narrow cañon, cut by a cold mountain stream. The stream was sluggish, the spring run-off being long past. She found twin sentinels; two spires of rock shaped by millennia of patient sandblasting. She found an overlook

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

above a vast untouched forest and spent many hours on that pinnacle wrestling with herself.

During one of her hikes she crossed paths with a bobcat. The cat backed up and snarled, and Sarah stood very still while the cat looked her over. Then the cat decided that she was too big a bite for dinner, gave her a parting snarl, and disappeared into the brush. Only then did Sarah relax and find that her hand gripped the handle of her knife. It was easy to forget that Nature was not a Walt Disney cartoon. These animals and plants ate each other.

In the evenings she returned to the cabin and sat in the shade of the old pine tree and watched the Sun set. There was nothing to compare with a sunset in the mountains. The peaks remained lit long after the Sun had fallen below the horizon. They were tall enough that atop them it was still daytime even though the slopes and cañons were shrouded in night. Glowing white peaks, orange sky, black forest. The Indians had called these the Shining Mountains, and they were right about that as they had been right about so much else. Hawks floated quietly overhead, and once she thought she spotted a bald eagle.

At night, when the stars lit the sky with a splendor unimaginable in the bright lights of the eastern urban megalopolis, she sat before a crackling fire and sipped strong coffee from a tin cup. Western coffee, when properly made, should allow the stirring spoon to remain standing upright. There were city dwellers she knew of who had no concept of the number of stars or the immensity of the Universe. Only a few pitiful lights pierced the flashy gloom of their night skies.

Altogether it was as fine a place as any for soul-searching. She was as alone as she had ever been. The nearest other human being was who-knew-how-many miles away. She could sit down beside herself and talk it out. How exactly did she feel about the Associates? About Red and his group? About not being Sarah Beaumont ever again?

It was that last question that ate at her more than anything. The Now was always dying and if a person was anything, she was who she *was*. That is, she was the culmination of years of growth and development, from childhood through adolescence to adulthood and (hopefully) into maturity. You couldn't cut away your past without cutting away part of yourself.

Or could you? Some people did. They put on new names and new histories like others put on a suit of clothes. They could leave their past behind and never look back. Were they stronger than she was, or weaker?

One day she returned to her cabin and put some coffee on the fire. She sat tailor-fashion, her legs crossed, with her back to the old bristlecone, watching the front door of the cabin. In a few minutes, the sunset would be framed in the doorway. She cradled the cup between her hands, sipping coffee from time to time. It tasted a little sweet, although she had put no sugar in it. She gazed at the dirt floor of the cabin, disturbed by something that she couldn't name. But there were no marks in the dirt, except her own footprints coming in.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

She shrugged and looked back at the doorway.

And there was someone standing there!

Her heart gave a leap and she started to stand up, but found that somehow her legs wouldn't support her. She sagged back into the dirt. A dreamlike lassitude seemed to have come over her. The figure in the doorway was a black silhouette, framed by the rays of the evening Sun. A glowing shadow. She couldn't make out the features.

Then the figure sat down beside her and she breathed a sigh of relief.

It was herself.

She was dressed in her blue suit, the one with the red bow that she had worn in the Civic Center Park the day she had been shot at. She looked herself over. Successful, independent. She knew who she was and what she wanted. Maybe she was also a trifle smug. She didn't have any friends. At least, she had never let anyone close enough to become her friend. But, if she held the entire world at arm's length, at least she was on top of it. Respected. Admired. Magazines had done feature stories about her.

"Well, you certainly have come down in the world," she told herself.

Herself shrugged. "Not me. I'm what I've always been. On the fast track to Number One. You seem to be a little down on your luck, though."

"Am I?"

"Sure. You don't know what you want anymore. People are hunting you to kill you; and the whole world hates your guts. Tell me that's going up."

"Somehow, I thought . . ."

"You thought what?"

"After that business on the mountain. With Crayle—" *When you killed a man.* "Somehow, I thought that would be the end of it."

"Roll the final credits?" Herself was sarcastic.

"And everyone would live happily ever after."

"They only roll the final credits once, sister. No one ever lives ever after; and no one lives ever happily. Not all the time."

She didn't bother to answer. "Why are you here?"

"You need someone to talk to. Who better? Who else knows you as well as I?"

Sarah seemed to hear the hum of another voice underneath the words. As if other words were being spoken and answered. It was barely audible; like the bass note of an organ, it blended in with the other sounds. She tried to turn her head to look for the sound, but found she couldn't summon the energy.

She looked at the polished and professional image sitting next to her. "What makes you think you know me at all? You're what I used to be. Someone I can never be again. Even if this all blows over, I can never be what I was."

"Oh, blow me some more tears, sister! I'll need a raincoat before you're through. Who ever said you could be? Who in the whole history of the world ever could stay what they were forever? Not you; not me; not anyone. Look at me close and see if you can find Chicago's South Side. There's a little girl back there that *I* can never be again."

Sarah looked away, at the sunset framed in the doorway of the cabin. "That was a long time ago. It's not real any more. You're not real. I'm hallu-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

cinating." Somewhere in the back of her head she remembered that the difference between reality and hallucination lay in the information content. A hallucination could never tell you anything you didn't already know.

"What if you re hallucinating?" herself asked her. "What does it matter? Tell me that you've never re-created yourself before and I'll call you a liar. When did you last see Lulu or Geraldine? Or Big Martha?"

Names from the past. Names without reference. Small childish faces screaming on the playground. The grim Chicago skyline in the backdrop. She couldn't imagine them as adults.

"Or Daddy?" the vision persisted. "Do you even know if he's still alive?"

Sarah scowled. "He left us. When Mama died. He got in his rig and went on the road and he never came back."

"Maybe it was just too hard for him to come back, with Mama dead. We were all grown up by then, even little Frankie. He never cut out when it would have been easy; when so many other fathers did. When staying meant scrimping and just scraping by and doing without. Mama stood by him all through that; and then, when the job was over, when he had seen us well and truly started, when they would have had their own time together, she was gone. No, I don't 'spect he could have stayed."

"Maybe that's why I left, too."

Herself sneered. "What, so you might find him someday on the road? Have you ever gone back just to put flowers on Mama's grave?"

"No!" She buried her face in her hands. "And if I do what they want me to do, I never can!"

"Oho! That's the problem, is it? Not that you ever *did;* but that now you never *can*. That lifeline was always there, even if you never tugged on it. Like that ol' bristlecone pine there behind you, with his roots sunk deep into Mother Earth. It's nice to sit in his shade; but it's a comfort just knowing he's *there*."

She raised her head and looked at herself. "Tell me what I should do."

"No, child. No one can tell you that."

She blinked and looked at the figure. It wasn't herself anymore. It was Mama. The way she looked before she took sick, with the square-jawed face and the mischief in her eye.

"You always were a headstrong child. Never were a one for the apron strings, or strings of any sort. But, by God, you never did run wild. You had a compass in your head that always pointed you right. Your Daddy told me so one night. He said you could fall into a cesspool and come up with someone's lost diamond ring on your finger. You do what you need to do. You'll do the right thing."

"But I don't want to lose you, Mama."

"Oh, don't talk foolishness, child. There is no way on God's green earth you can lose me. Because you carry me here . . ." She reached out and touched Sarah's head. ". . . and here." She touched Sarah's heart.

Sarah leaned over and hugged the figure and cried.

In the morning she awoke with a start and looked around her. She was lying on the ground, not even on her sleeping

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNC CHG
ELECTRONIC REPRODUCTION PROHIBITED

bag, and she was chilled to the bone. She pushed herself upright, and her stiffed muscles protested at the abuse. She bent and stretched, trying to loosen up. After a few limbering exercises she felt a little less like an embalmed corpse and a little more like a human being.

She went to pour herself some coffee and stopped. The fire was burned down, but the coffee pot had been carefully set to one side, along with her cup. She picked up the coffee pot and saw that it had been thoroughly scrubbed. She couldn't remember doing that.

She remembered clearly her experiences of the previous evening. How she had spoken with her previous self and with her mother. It had seemed so natural at the time, so matter-of-fact, but now the weirdness of it settled over her. What on earth had happened to her?

She looked around, at the cabin, at the old pine. Maybe it was the place. Weird was the old Anglo-Saxon word for Fate. Maybe there was something fateful about this place.

She began gathering her things together. It was time to leave. Like the old Indians, she had gone to a lonely spot and had a vision that told her who she would be from now on. That was how the Indians learned their adult names. It wouldn't be right to tarry in such a place.

She noticed the dirt. Perhaps she half expected footprints, some physical sign of her nightly visitors.

But there were no footprints.

And there should have been! Her own footprints. And now she remembered having noticed the oddness last night. The ground then had only held her own prints coming in; and they should have held her own prints going out as well. In and out several times, in fact. Now even those prints were gone.

And that meant . . .

And that meant that someone had been in the cabin while she had been out walking in the cañon. Someone who carefully brushes out his—or her—tracks. Someone who, perhaps, had drugged her coffee. Experimentally, she sniffed the coffee pot, but could detect nothing except the sharp smell on the metal itself.

She crouched down and studied the ground. Yes, she could see the signs now. Someone had used a leafy branch to brush the footprints away. She followed the sign out to the old Indian trail. There it vanished, but she found the broken branch that had undoubtedly been the tool. She looked up and down the trail. Which way had her night visitor gone?

Whoever it was must have had a horse, and must have stuck to the trails. Going off across country was a good way to get trapped in cañons or cliffsides or among impassable trees. Better to follow the paths left by the Indians and the forest animals. She cut for sign, walking slowly and carefully in a wide circle around her cabin, studying the lay of the land.

Five hundred feet down the trail she found a small hole in the ground and grass that had been cropped. This must be where he had staked out his horse last night. She found no hoofprints, but she remembered the old trick of bundling a horse's hooves in sheepskin so they made no definable mark on the ground.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

She knew he couldn't ride far with his horse hobbled that way!

She scampered back to where she had left the grulla and quickly packed and saddled the mare. Then she set off down the trail in the direction her visitor must have taken.

Two miles farther on, she found a hoofprint. Once away from the cabin, her visitor must have felt safe in unbundling his horse's hooves. She studied the print closely, noting the crack in the shoe along the left side so she would recognize it when she saw it again. Then, carefully, she followed the trail.

After several hours, the Sun was beginning to get low and she was wondering whether to put off further tracking for the day. She pulled up on the reins and looked around for a campsite.

There was a likely spot off to the right. A grove of aspen and a clearing. She dismounted and walked into it.

Immediately she sensed the wrongness. It *was* a good campsite. So good it had been used frequently, and recently. She knelt and felt the ground. It was still warm where the fire was buried. There the grass was crushed where someone had slept. And there was an oft-used path between the campsite and . . . where?

She tied the grulla to a tree and walked down the footpath. She pulled her knife from her belt and licked her lips, stepping carefully so as to make no noise. No one was in the campsite now, but it was best to take no chances.

The trail led around a knob of rock that looked vaguely familiar. There was a sort of nest in the rock there with a wall-like ledge before it. She stepped into the nest and looked over the rocks.

And she saw the ranch spread out below her. The Associates's safe house.

The horses were gathered in the corral directly below her. The ranch house was a little further out and she could make out two figures on the back porch. With a decent pair of binoculars she knew she could identify them. With a parabolic mike, she could hear every word. One of the figures threw something to the ground and stepped off the porch stretching his arms.

The stallion in the pasture below stood still and looked up in her direction. She remembered how he had done the same thing not too long ago, when she and Red had shot the breeze on the fencepost.

Someone's been spying on us! she thought.

Us?

As simply as that, she had joined the Associates.

IX

It was a lot like jumping off a cliff. Once the initial choice was made, everything else followed quickly and inevitably. The operation was performed like all Associate operations; quickly and quietly and with a minimum of disturbance. The surgeon that flew in made her suggestions and Sarah made her choice; and she came out of it with her head swathed in bandages, still wondering the same thing.

For several weeks she lay in the clinic bed on the lowest level of the underground warren; and SuperNerd and Tex and even Janie stopped by from time to time to see how she was doing. She told

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

them she was fine and she couldn't wait for the bandages to come off and she didn't ask them where anyone else might be or why they hadn't stopped in.

After what seemed like an endless wait, the bandages did come off.

And then the real work began.

Sarah tried to avoid looking in mirrors; it became almost a habit with her. When she walked down the hallway, past windows or other reflecting surfaces, she averted her eyes. When she washed up in the morning, she would not look directly at her reflection. It wasn't that she was ugly or misshapen. Far from it. It was just that the woman in the mirror was a stranger.

She had studied her new face for a long time after the bandages had come off, turning the glass this way and that; trying to see it from all different angles. It was darker than her own had been. The brow seemed higher; the nose, a little broader. Somehow, they had changed the shape of her mouth, so that her smile was wider than it had been. All in all, not a bad face. It would cause more than one head to turn. But, try as she might, she could see no sign of her mother in it.

Sarah closed the booklet she had been studying and leaned her elbows on the library table. She rubbed her face wearily. A long day. Too long. She glanced at the booklet, a three-ring binder with a yellow cover. *The Life History of Gloria Bennett.*

That's me now, she thought. *Gloria Bennett.* She ran the name across her tongue to see how it tasted. Gloria Bennett.

She quickly suppressed the spasm of regret. It wasn't as if she had gone into it with her eyes closed. She had thought about it long and hard. She had agonized over it in her mountain retreat. She had made her decision, dammit, and there wasn't any point in dwelling on might-have-been's.

The left side of her brain kept telling her that. Really, it was the best choice —the only choice!—she could have made. And, regardless of how she felt, there was no turning back the clock. The left brain arguments were logical, reasoned arguments. But sometimes she was in her right mind and couldn't help glancing back a little wistfully at who she had been, and wishing that none of this had ever happened.

Well, if wishes were horses, beggars would ride.

At least, she was Gloria Bennett only when she was Outside. She had insisted on that before agreeing. Among the Associates, with Red and the others, she could still be Sarah Beaumont. A scrap of her life that she could hold onto, like the ragged remnant of an old security blanket. She wondered now whether that had been an unspoken factor in her decision to join the Associates. The realization that the only way to retain a fragment of her old life was to live it here, in a Society she detested.

She picked up the booklet and gazed at its cover. The Associates were certainly thorough when it came to setting up false identities. She had to grant them that. There was nothing flimsy about the persona they had given her. Gloria had been a real person. She had had a real

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

life, and people had really known her. But she wouldn't mind that Sarah would be using her name; because five years ago, in a light plane crash in the Canadian Rockies, Gloria Bennett had ceased to care about anything at all.

The accident had been a stroke of luck for the Associates, if not for the passengers in the Cessna. A chance combination of circumstances had enabled the Associates to co-opt the identities of all three people aboard and "bank" them as personae for themselves. The crash had occurred in a remote area of British Columbia, and it had so happened that the area ATC was an Associate. She had managed to delete all traces of the accident from air traffic control records, and three other Associates had "completed" the ill-fated flight. Then they had "quit" their jobs at home and "moved" to remote areas, where old friends were unlikely ever to look them up.

There was a cruelty in that; that abrupt and unexplained severing of old ties with family and friends. It cast people adrift, loved ones who wondered why they had been left behind. It left voids in dozens of aching hearts that could not be properly filled with mourning, and remained as abscesses of inchoate resentment. It was kinder by far to let a person know she had been widowed than to let her believe herself abandoned. But Sarah had grown used to—without accepting—the off-hand callousness that marked the Associates's activities. When one is accustomed to the abstractions of meta-history, what do the lives of a few individuals matter?

Sarah had been concerned that someday she might run into one of Gloria's old acquaintances, but Tex Bodean had visited her in the clinic and told her not to worry. Those who had known the original Gloria well enough to matter had been out of touch with her for many years; and the plastic surgery had made the resemblance as close as was physically possible. Others had worn the Gloria persona for short periods; but they had made no close friends and, to casual acquaintances, would have looked much alike. The briefing booklet contained the details on all such contacts.

In one way, that was good news. It meant that she was unlikely to be unmasked by accident. In another way, though, it saddened her. If Gloria had been a person rather than a phantom, she would have been an intensely lonely woman, with no close friends and no ties to her family. It was necessary that it be so. To maintain the charade among close relatives and childhood companions would have been impossible. Yet, it seemed as if the persona they had given her was all too close to the life she had been living before. Putting on Gloria was like pulling on a worn and familiar dress. It was comfortable and it fit very well. But she noticed now how faded and drab it was.

She wondered if her prior life hadn't been something of a persona as well. A mask that she had put on for other people to see. A mask that she had put on even for herself.

The good news was that Gloria was rich.

She hadn't believed it when they told her, but she had hacked into the data bases herself and verified it. As "Gloria," she had enough money squirrelled

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

away in various caches to support herself comfortably for the rest of her life. The Associates could well afford it. They were so wealthy that generosity meant nothing.

She remembered what Morgan had written in his notes: "They bought Xerox before it became a verb." For a hundred years the Associates, knowing which way the wind was about to blow, had trimmed their sails to catch it. Not that their forecasting was perfect. Far from it. The wind shifted frequently, for random or unknown reasons. The Associates had invested heavily in steam automobiles, for example. But even a modest edge over the rest of the world had accumulated into a handsome return over the course of a century.

She wondered momentarily what was happening on the Outside, in the world beyond the walls of the safe house. She had been starved for information ever since coming here. She was Alice-down-the-rabbit-hole, living in an unreal world full of bizarre events; and every day she spent here was another day further removed from the life she had known.

Perhaps that was deliberate on the part of the Associates. A brainwashing tactic; so that, when she finally did emerge from this underground womb, she would be reborn, almost literally, as Gloria Bennett.

She rose from the table and walked idly around the library, stretching her back and arm muscles. She felt cramped from sitting at the table all day. As she walked, she glanced at the titles on the shelves, sometimes pulling a book out and leafing through it. She was tired of studying Gloria every day. Tired of sleeping with earphones on. It was impossible to sleep that way and awake fully rested.

The library had an extensive selection of books on anthropology, systems engineering, statistics, psychology, economics, topology. All the topics that a good cultural engineer needed to master. Most of them, she saw, had been written by and for the Associates, and privately printed. She also knew, because she had asked, that the real library was much larger than this, with most of the "books" being in hypertext. Hypertext was the coming thing. "Real twenty-first century stuff," Tex had assured her. Still, there was something undefinably comforting about the smell of old paper and ink, about the heft of a morocco-bound volume in the hand. Some chord that had been ingrained into human society since the first Egyptian brushed berry juice on papyrus. Without these rows of books, it just wouldn't have felt like a library.

Science fiction?

She paused at a short shelf of books and booklets and ran her fingers across the spines. Science fiction, the shelf label admitted. She read the titles. *Foundation, No Truce with Kings, The Squares of the City, Doomsday's Color Press.* Some of them were novels. Some were shorter fiction, privately copied and bound, in blatant disregard of the copyright laws.

Now why would the Associates enshrine a modest little collection of sci-fi, she wondered? She knew some of the stories, and browsed through a couple that she didn't. Then she chuckled to herself. Of course. All of them involved some attempt to direct or control the course of history. Psychohistory.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Subliminal persuasion. The Great Science. The Kiersten Equations.

Evidently, no one else had ever thought to call it cliology.

She made a mental note to read the stories sometime and continued her slow circuit of the shelves. The librarian, a 250-pound man with a Mongolian scalplock, watched her without interest. He was cataloguing files intermittently, not a task that required his full attention. Sarah wondered what role he played on the Outside. The Associates tried to position their people at the critical nodes of the communications net, but this man looked more like a biker with a stomach ache than an opinion-shaper. Well, it took all kinds.

She came to a set of thin volumes on the upper left hand shelf against the back wall. Their spines were too narrow for titles. She pulled one down and looked at the cover.

Rules and By-Laws of Utopian Research Associates.

The typing was crude; the letters uneven, reminding Sarah of the old manual typewriters, with their dies at the tips of long, complex levers. It was signed in faded brown ink by Brady Quinn.

Hello, Brady, she thought. *Long time, no see.* Quinn was like an old friend now. She flipped the pages at random. *I suppose I'll have to memorize these sometime.* She read a page.

"Rule 24. Associates making use of cliological data and projections for their own advantages must keep their brothers and the Council regularly apprised of their activities."

The entry was followed by a comment that it superseded Rule 4. There was a lengthy "Statement of Intent" and two amendments, one of which had, in 1887, changed "brothers" to "brothers and sisters."

I suppose any organization must have its rules and by-laws. But it seemed odd that people planning to control the world would bother with such commonplaces.

I invoke Rule 19.

Whoever had said that at the meeting she had overheard. . . . When? A month ago? Whoever had said that had prompted a great deal of laughter, at her expense and Red's. Curious, she paged toward the front of the book.

The first item was Rule 21.

So where was Rule 19? Why would anyone start numbering their by-laws at 21?

Answer: They wouldn't.

"Excuse me," she called across to the librarian. The man looked at her and raised an eyebrow.

"Where can I find Rule 19?"

"Nineteen?" He scratched his double chin and ran his hand through his scalplock. "Say, aren't you Red Malone's friend? The one they just ran through a make-over?" Make-over? Well, you could call it that. "Yes, I am."

The man grinned, as if at some secret joke. "I supposed Rule 19's pretty important to you, then."

"Are you going to tell me how to find it, or not?"

He flipped his hands out. "Don't get huffy. It's in volume one." He pointed vaguely toward the shelves where she was standing.

Naturally. Her ears burned. There were several other thinly bound folios where this one had sat. She pulled the others out, looking for Volume 1. *Cor-*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

respondence of Jedediah Crawford, Ph.D. Proposed Design and Construction of Babbage Analytical Engines. Constitution and By-Laws of the Babbage Analytical Society.

Oh. Of course. When he had started his splinter group, Quinn must have kept most of the original rules. The second folio contained only the new ones.

She opened the volume and thumbed through it. This booklet, she saw, was much older, hand-written with a flat-nibbed pen in an elegant, curlicued script. That had been an era when penmanship was considered an art form, and a "good hand" was a mark of social distinction. The ink was brown, almost copper in color. The pages were brittle and cracked around the edges and smelled of more than a century of slow oxidation. The title page bore the signatures of J. Crawford, I. Shelton, and P. Hammondton. The Founders. She wondered what kind of men they had been.

She thumbed a few pages, noticed Rule 4, the one that had been superceded by Rule 24, and read it. "Selflessness and the Common Good must be the Motivating Force of all Brothers." The rule forbade members from using their researches for personal gain. She remembered Red telling her that this rule had been the original Society's undoing. That it went against human nature.

"Selfishness isn't human nature," she had protested to Red. "No," he had answered with that irritating grin of his, "but self-interest is."

She wondered why Red had not come to see her during her convalescence. She had expected him; waited each day to see if he would show, but he hadn't. Was he out on an "op"? She hadn't seen him at all since the day she had returned from the mountains and told him of her decision to join. She had gone into the clinic the next day, before she could have second thoughts. Perhaps, once her decision had finally been made, his task was done. Perhaps that all she was to him? An "op."

Brusquely, she turned her attention back to the book.

The three Founders had been sincerely altruistic; but their altruism was inevitably diluted in communicating it to new recruits. By the 1870s the Society had become composed largely of men who considered their own, private interests to be at least as important as those of the Founders. And so much for Rule 4.

So, where was Rule 19? If Quinn had started with #21, then #19 must be near the end of this volume. She turned the aged pages carefully. Yes, there it was. She read:

"Rule 19. In order to Assure that Our Brothers have a Vested Interest in the Felicitous Nature of future Social Conditions, it is Imperative that each Brother marry and sire Children, for Whose Well-being and Upkeep he assumes Full Responsibility."

She snapped the book shut. A sound behind her made her turn in time to see the librarian swallow a smile. She felt her face flush, but she kept a stony look on it until the librarian coughed self-consciously and returned to his cataloguing.

Sarah opened the book again and reread the rule. Son of a bitch. No wonder

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

those bastards had laughed so hard. She and Red? Nonsense. It was absurd!

She closed the folio carefully and replaced it. Returning to her reading table, she gathered up her things and walked out. The librarian watched her go, still trying to grin without being obvious. "Have fun," he said.

She didn't answer him. She wanted to slam the door instead; but it was one of those swinging doors that went both ways, so all it did was swish.

She turned and stalked down the hall. Male chauvinists, all of them. Even Janie Hatch and the other women in that meeting. Sarah supposed that Red was under some peer pressure to fulfill Rule 19. One of the amendments had specified a time limit, and he might be approaching it. But that gave them no right to discuss her as if she were nothing more than a breeding cow!

Or, for that matter, as if Red were nothing but a stud bull.

Dammit!

She realized she had turned the wrong way down the hall. She was in a section of the underground warren she did not recognize. The walls were painted a muted pink, with green macro-designs in abstract geometric shapes. The plants situated here and there were artificial, but they lent an air of spaciousness to the corridor. Doors opened onto offices, some empty, some with people in them doing incomprehensible things. Farther along she saw a canteen with three people sitting around a table drinking coffee from a vending machine.

An office complex, no different than thousands of other corporate offices anywhere in the world, except it was underground. But what the hell, running the world was big business, wasn't it?

She decided to continue the way she was going. Sooner or later she would find an elevator bank or a manlift to take her to her own level. Meanwhile, she liked exploring.

The hall ended in a T-intersection and she flipped a mental coin and turned left. She wandered into a game room with chessboards and go-boards, some of them laid out in mid-game. One board had a sign: "Black's Move —Anyone Can Play." She glanced at the reverse side and saw that it announced White's move. She studied the board for a moment or two and saw that Black was engaged in a classic Philidor Defense. Not a very good position for Black. Well, that made it more interesting. She reached out and played P to KB5. She turned the sign around. Two women were dozing over a complex gambit at another table. One of them was smiling, one frowning. They saw her and the smiling one waved absently. Her opponent scowled at the distraction.

She left the game room and resumed her explorations. She knew the Safe House was not nearly as big as it seemed. But there were so many levels and corridors and doublings back that, walking around inside, it seemed vast. That was intentional. This facility and the four others spotted around the country had been designed to house necessary Associate operations. Tasks that had to be done—even secret cabals had filing and paperwork—yet done privately. Some of it, Sarah knew, occurred in anonymous offices in high-rise towers in every major city. Often, on secret floors accessible only by means

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of special elevators. "Admittance to Authorized Personnel Only." There was a reason why so many office buildings lacked a "13th floor." But the sensitive work was done in hidden Safe Houses. People lived here for months at a time and a feeling of spaciousness was essential to their mental well-being.

She saw an elevator ahead, at the juncture of another T-intersection, and hurried toward it. As she did, she heard music; the faint, squeaking sound of a clarinet drifting down the other leg of the T. She paused and listened. It was the same piece she had heard in the orientation class a month ago: the solo part from *High Society*. Whoever the secret jazzman was, he had finally mastered the syncopations. The music scampered and danced.

She tracked the sound to a small room thirty feet down the corridor from the elevator. The door was slightly ajar and she peeked through it, to see a man sitting on a metal folding chair with his back partly toward the door. He was dressed casually, in jeans and T-shirt. The T-shirt was burgundy and read "My Brother's Bar" across the back. He had dark hair and a long nose; but his fingers were short and his overall build stocky. His face . . .

His face! She stepped into the room.

"Never sit with your back to the door," she said. "That's how they got Hickock."

The man started and turned and faced her. She studied his eyes.

"Red?" she asked haltingly. "You are Red Malone, aren't you?"

"Would it matter much if I told you I was Jimmy Caldero?"

"You *are* Red! What have you done?"

"You of all people should know. Hey! You better sit down before you fall down."

She slumped into a chair like the one Red was sitting in. There were similar chairs and music stands scattered about the room. The metal was hard and cold against her back. Red cocked his head, seemed to see something in her face, and turned away. He toyed with his clarinet. Keys and pads clicked like tiny hailstones.

Sarah couldn't stop staring at his face. It was subtly different from the one she had known—in the shape of the nose and the chin and the ears; but she could see the old Red in there, peering out through the eyes, like a prisoner from behind bars.

"Red. Why?" It was silly, she knew, but she felt as if she had lost an old friend. That was the problem with people. As soon as you really get to know someone, they cut out on you. They died, or they went on the road, or they changed into someone else.

"Why? Why do you think? Same reason as you. Same reason as two dozen others in the organization. You didn't imagine you were the only one whose identity needed changing, did you?"

"You never mentioned it."

"You had your own problems."

Sarah realized that she hadn't given the matter much thought at all. She had been so wrapped up in her own crisis, she hadn't realized that others might be having one, too. "It's different for you," she said. "You do it all the time."

Red rubbed his hand over his nose and chin. "Not this. My face aches as much as yours. Sure, I've changed

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

names and backgrounds before. Who hasn't? But I always managed to keep my own mug. What do you think?" He turned profile. "Am I more handsome than before? I didn't think it was possible to improve on perfection, did you?"

"Red, I'm sorry. It was my fault."

Red shrugged. "Hey. You gotta do what you gotta do. I'm just glad Our system was better protected than Theirs. Nearly all of your Dump was from Society files. Kennison was inexcusably lax. If he worked for me I would have fired him. You didn't even touch my own personal system—" He broke off suddenly. "You know what I mean."

Sarah knew he was talking about the parasite system he and his cabal were running. Red had already told her that it had been off-line while her worm was running. A coincidence, but one that had saved their system. Sarah wondered what Cam Betancourt would have done had he seen Red's secret files among the printouts. What did the Associates do with subversives in their own ranks?

"So, what do you do now?"

"We got word that my old employers—"

"The CIA."

He looked annoyed. "No. Don't try to be too clever. I was with the DIA. Defense Intelligence Agency. Not as "Red Malone," but as . . . well, that persona doesn't matter any more." He rubbed a hand across his face again. "The fact is, someone in the Agency saw my cover in the infamous Beaumont Dump. We got the word, from one of our people still inside, that the Agency was investigating. They back-tracked my cover identity until they blew it apart." He looked at his clarinet and his fingers worked a few keys. "Do you know how hard it is to get a false persona past those bastards in the first place?" He shrugged. "Well, I'm out of it now. They knew my old face, so I changed it. But we can't change fingerprints—not enough to fool that crowd, anyhow. So here I am . . ." He blew a scale on his instrument. "On vacation."

"Then, not everyone is treating the Dump as a hoax."

"No, not everyone. There are some folks out there whose job it is to take every possibility seriously. Maybe too many folks."

"You don't sound bitter."

"Bitter? No. I get unemployment. I'm rich, don't forget. Oh, don't get me wrong. The Agency was fun. It was important work. We need pipelines into those restricted databases and I liked what I was doing in that niche. The fact that I would have disappeared into Leavenworth if they'd caught on only added a little Tabasco to the sauce." He put the mouthpiece to his lips and licked the reed. "I think I'll miss the rummy games as much as anything. Still . . ." And he shrugged. "I'm just as happy to be out of it. Try something new. Maybe get back into Adjusting." He began a C-major scale.

"Or raise a family?" asked Sarah.

The clarinet squawked like a duck on high F. He put it down again and inspected the mouthpiece. "Chipped reed." He tightened the embrouchure. "You know about that, do you." It was a statement, not a question.

"Rule 19," she said.

Red grunted. "Yeah."

"Do you plan to, ah . . . comply with it?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"I told you. I'm the wild and independent sort. Being tied down isn't my style." He cocked his head and looked at the ceiling. "I wonder if I have any bastards around the country. That might satisfy 'em." He looked at her. "Rule 19 applies to you, too, you know. You're one of Our Sisters, now."

"Uh-huh. Barefoot and pregnant. That's me. The Utopian Research Baby Machine."

"Don't be cynical." He was silent for a moment. Then, in a different tone of voice, "Tell me. If you were organizing a group of people to 'design a future'—how would you assure that they went about it carefully and responsibly?"

"Well, I'd try to recruit only people with a sense of responsibility to the community."

Red shook his head. "It won't work. How do you measure it? How do your recruiters screen for it? How do you assure its continuance, generation after generation? No, the mechanism must be something simple, measurable, and automatic. Something that makes responsibility self-enforcing."

"Every Brother and Sister must have someone they love held hostage to the future," she quoted.

Red smiled with half his mouth. "Exactly. The Rule isn't about giving birth. It's about accepting responsibility, and maintaining constancy of purpose. So Quinn and Carson built self-interest into it. Not altruism. Never trust an altruist. He'll sell you down the river for the sake of a Higher Purpose. It's negative feedback that makes responsibility self-enforcing. Like requiring landlords to live in the buildings they rent; or manufacturers to place their intake pipes downstream from their effluent pipes; or airplane mechanics to fly in the planes they repair. See? Compliance is easy to confirm; and that compliance assures that the businessman or the landlord or the mechanic acts responsibly. No rights without responsibilities. Self-interest is the key. Altriusm is like building a dam. It doesn't last. Sooner or later, the river of history bursts through, with catastrophic results. Self-interest goes with the flow, but harnesses it; makes it work. The Founders believed that the best protection against haphazard tampering with the future was to give the tamperers a stake in the outcome. Something that would make them more thoughtful regarding their plans."

"It's a good theory," said Sarah, "but I can think of two flaws."

Red grunted. "Only two?"

"What stops members from just going through the motions? Pop a kid, pay for its rearing, but otherwise ignore it. I've known plenty of parents who never did more. And even if they do care, will they build the best possible future for everyone, or only for their own children?"

"I won't argue with you. It's not a perfect system. Nothing is perfect."

His smugness irritated her. She was talking with a stranger. "Some things are," she said.

"Oh? Name one."

"The trio section of the *Maple Leaf Rag*."

He looked momentarily perplexed, then he laughed. "All right." He nodded at the spinnet sitting against the far wall. "Prove it."

"What—"

"Want me to twist your arm? Come

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

on." He stood and tugged her off her seat.

Red evidently was willing to discuss any subject but Rule 19 and how it might apply to himself. She allowed him to sit her at the old upright, where she ran up and down a few tentative scales. Her fingers felt huge and clumsy. "It's been a long time," she protested. "I haven't had time for play, lately."

Red shook his head. "You should always leave time for play."

She started the rag, stumbled over a chord, and started over. She was tentative at first, unsure of herself; but she soon found the tempo. Ragtime, Joplin had said, must never be played too fast. Her left hand beat out the steady bass rhythm while her right played with the syncopations. A classical rag followed a set pattern: AABBACCD; but she played the first two themes without repeating so she could get into the trio sooner. She rolled into the dancing strains easily, leaping up and down the keyboard. There was a bittersweet triumph about Joplin's music. Something at the same time sad and grand; as if some secret victory had already been won. The *Maple Leaf* had been his crowning achievement. "The King of Rags," they had called it. Every note in it was exactly right.

When she had finished, for some odd reason, she felt better than she had felt in a very long time; as if a terrible burden had been lifted from her. Her fingers wandered into another light rag, remembering how these tunes had formed the backdrop to her childhood. "Do you want to try it with me?" she asked Red.

He shook his head. "I'm not that good."

"You were doing all right on *High Society*. I heard you from the hallway. That solo you were playing is a test piece for jazz clarinetists."

"It's not that," he told her. "Not the technical difficulty. It's the . . . the ear, I suppose. I can't play what I hear; I have to read it. Memorize it." Incredibly, he blushed and looked away. "I play notes, not music."

"You say that like you're admitting to pederasty."

"Play some more, would you? I kind of like that old-time music."

She let her hands drift into *Panama*, then into the *Oklahoma Rag*. The Okie had been written by a white man, one of the few who had really understood. She was aware of Red watching her the whole time. She thought that should have made her nervous, that concentrated attention of his; but it seemed the most natural thing in the world. She closed her eyes and let the music lift her and carry her along. If she didn't worry about it, her fingers found the right keys without trouble. It was like falling off a bicycle; you never forgot how.

But when she opened her eyes at the end and looked at him, she saw that he was not watching her hands at all. She ducked her head and stared at the keys. "I'm out of practice," she told him again.

"No, don't apologize. You were very good. They have a little jazz group here, you know. I play with them whenever I'm around. Chicago-style, a little Dixieland. Why don't you join? I think it'd be a good thing."

She turned her head and searched his face. The strange, new face. She didn't know how to read him any more. If she ever had. She realized suddenly how

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

little she knew about Red Malone.

"For the group, I mean. They don't have a regular piano player."

She shook her head. "I don't play in groups. I just play for myself."

"You should try it. Really, you should. There's something about playing in a group." He walked back to one of the chairs and sat down. He wet his reed. "I can't describe what it's like. How it feels when everything clicks and harmonizes. I remember one time . . . Oh, this was ages ago, in high school. The band was rehearsing one day during lunch period. It was your typical high school piece: a medely of tunes from Tchaikowsky. We were tooting and scraping our way through it when, suddenly, it all came together. The notes, the timbre, the voicing. Everything, just right. It was as if Something was playing us like a single instrument. It sent shivers down my spine. We played the theme from *Marche Slav* in big, booming bass notes and segued into the quickstep from the *1812 Overture* without missing a beat. Our conductor, Mr. Price, swung his baton like a madman. Kids on their way to class, they stopped in the gym to listen. They crowded in from the hallway. And, when we finally climaxed, they cheered and clapped." He shook his head. "Not polite applause, like you get a concert. They gave us an ovation. Because they could feel it, too. Someday, you might look up the root meaning of 'inspired.' "

Red was an ensemble player, Sarah thought, not a soloist. Yet, she had never met a man so much his own individual as Red seemed to be. Another contradiction in that bundle of contradictions.

"Well," said Red. "I guess I'll be packing it in here."

And Red was not the type for self-revelation. Like a flasher in an alleyway, having exposed himself for a moment, he must button up and vanish. "Yeah. Should I close the piano up?"

"What? Oh, no. Don't bother. People wander in here at all hours, just to relax."

"Sure." She rose and picked up her books. "I guess I'll find my way back to my rooms." She hesitated, wondering if Red would walk with her.

"I'll give you a call tomorrow," he said, fiddling with his instrument case.

"Oh. Sure. See you around." When she left the music room, she did not walk to the elevator, but stopped in the hallway just outside the door, leaning against the wall. After a few moments, she heard him play again. This time it wasn't *High Society*, but the first movement of Mozart's *Clarinet Concerto*. The clarinet sang the throaty notes of the low register and the bright, crystaline notes of the high register with equal authority and technical precision. He played with grace and clarity. She closed her eyes and let the music take charge. In his own dialect, Mozart had achieved as much perfection as Joplin.

Then the elevator chimed and the doors opened and two people got off; and, rather than have them wonder why she was hanging around outside the music room, she got into the car and let the doors close her into silence. ■

Editor's Note: This story is a sequel to In The Country of the Blind, *published here in October and November, 1987.*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

OK, I'd like to believe this one's fantasy, too.
But are you sure it is?

Randy Asplund-Faith

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

TIME OUT

Jerry Oltion

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The red light was glowing on my answering machine when I looked into my study. I'd expected it to be; three days away usually meant half a tape full of messages at least. I sighed at the thought of listening to them all, filed it away in my mental list of things to do, and continued on past the study to the bedroom, where I dropped my suitcase, tipped over backwards onto the bed and lay where I had fallen. The messages could wait. Sleep couldn't.

The East Lake lab had been a zoo. Hospital laboratories are always zoos, but this time it had been worse. East Lake was in a college town, and their chemistry analyzer had gone down the week after classes started. It was a new machine, so having problems wasn't much of a surprise, but the timing could have been better. The hospital's patient load had just doubled, and the techs were having to use their backup machine—an antiquated Centrifichem batch processor—to deal with it, all the while cursing it and each other and alternately cursing at and pleading with me to get the Compuchem back on line. When it's like that, you work around the clock. In three days I had managed to steal four hours of sleep at most, all in fifteen-minute naps while I gave the diagnostics program shot after shot at the problem.

The symptoms were simple enough —the machine had been dropping reagent pills too late and they were missing the cuvettes, the little cups that hold the patient sample and the reagent so the reaction can be read by the photometer. A simple problem, and the solution would have been simple, too, if the adjustment had been mechanical. Of course it wasn't. Everything on the Compuchem was computer controlled. That was its big selling point. The entire machine was built around a brand new, superfast, state-of-the-art modular computer that regulated every function with a precision impossible with simple mechanical controls. That was also its biggest drawback from a service rep's point of view, because if the computer's diagnostics program couldn't find the problem then there was very little you could do to fix it.

There's an old joke that goes like this: How many software specialists does it take to change a light bulb? Answer: None, it's a hardware problem. OK, then how many hardware people does it take? None, because you can fix anything with software. The Compuchem was a little like that.

I'd given up on the software approach after the third or fourth time the diagnostic program had told me the problem was in the hard disk drive, while the separate disk diagnostics swore the drive was OK. I'd given up on the hardware approach after I'd taken the entire reagent delivery system apart and put it back together three or four times, and found nothing wrong there, either. Finally, in desperation I had called up the home office and had them ship me a new hard drive by air express, and when I put it in, the machine worked fine.

So how could a faulty hard drive influence the reagent pill drop timing? I hadn't a clue; I just fixed the buggers.

Most of the messages on my machine were dial tones, from people hanging up rather than talking to a machine.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Some people have expensive machines that don't record dial tones; I had one I could afford. I fast-forwarded through the hang-ups, listening to the gnat's whine, waiting for the chipmunk voice that would mean a real message.

"*KellythisisDianaWilson*—" a female voice said before I let off the fast-forward button. "Do you remember me? I'm in town for a couple weeks and I thought I'd try to catch up with you while I'm here. Maybe we could get together for a drink or something? My marriage to Cliff didn't work out, so I can actually go out on dates again. You're not married yet, are you? God, that sounds awful, and now you've got it on tape. Aaaagh! And your wife's listening to it. I'll pay whatever you ask. Why don't answering machines give callers a chance to erase a message? Well listen, anyway, I just want to see you again if you're around, and your wife if you've got—"

Her thirty seconds were up.

Diana Wilson, eh? Sure I remembered her. Tall, willowy, with brown hair, freckles, and a determination to succeed that had scared off nearly every man she met. She'd been so *intense*. She'd actually told me that she didn't have time for a boyfriend, because dates took too much of the time she needed for studying. I'd asked her when she figured she *would* have time, and she'd said, "After I've made myself indispensable at one of the biggest computer companies in the business."

So evidently she'd done that. I'd never heard of this Cliff before, but that's what his presence in her life had to mean. And now she was in town, almost eight years later, just casually dropping in but hinting on the answering machine that there might be more to it than that. I was flattered that she'd even remembered where I lived.

While the next stretch of dial tone buzzed past, I wrote on the note pad by the phone: *Diana Wilson. No phone number!* Then I pressed the fast forward again.

There were the usual messages from friends to call them back whenever I got in. I would call and leave messages on their machines. Some of those people I hadn't spoken to in person in months.

"*KellythisisDianaWilson* again. It's Tuesday evening, uh, 8:23. I thought I'd try to catch up with you again before I left town—I've got to fly back to Houston for a couple of days—but it looks like we're going to miss each other. My plane leaves at eleven tomorrow, but if you get in before then, give me a call at the Sheraton. Otherwise, well, I'll try to catch you again later on. Bye."

Damn! She'd called less than an hour before I'd staggered in, and I'd slept in late. By now she was already in the air, and I didn't have her home phone number. Why didn't people leave their numbers on answering machines?

I listened to the rest of the messages, jotting down the important details, then rewound the tape and recorded a new greeting. After all the hang-ups I felt like simply saying, "Answering machine, think fast!" in the hopes of shaking at least a startled, "Oh!" out of someone, but I went through the whole "I can't come to the phone right now" business, then finished it with, "And if this is Diana, *please* leave your phone number this time." That taken care of,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I called the office to let them know how it had gone at East Lake.

Mistake. Another Compuchem had gone down halfway across the state, and I was the only service rep not already out on call.

St. Vincent's lab was a lot smaller than East Lake's. It was in a twenty-bed hospital in a rich retirement community, which was the only reason they could afford a Comp. They had three techs and not a whole lot to do between them, which gave the whole place an uncommonly relaxed atmosphere for a hospital lab. I kind of looked forward to going there.

Except when I arrived, after a six-hour drive across northern California, I found the place in chaos. It was late evening by then; I should have had to beg a key to the lab from the security guard, but when I got to the hospital I found two techs still there, staring into the monitor of a new computer that hadn't been there the last time I'd seen the lab.

"Kelly!" one of the techs, Jeanette, said when she saw me. "Hey, come have a look at our new toy."

Their new toy was a reporting network that let them send test results directly to the nurses' station and the doctors' offices without leaving the lab.

"Theoretically it's supposed to speed up reporting and give us more time for other jobs," Rich, the other tech, said. "Right now we're still entering our normal values and the doctors' names and so forth. It's taking longer than we expected."

"It usually does," I admitted. "So what's wrong with the Compuchem?"

"It's missing the cuvettes with the reagent pills," Jeanette said. "Drops them too late."

"You're kidding."

"Not at all. Why?"

"I just fixed one with the same problem yesterday."

"Ah, well then, you should know right where to look on this one. Good."

I wasn't so certain about that. On something as complex as a Compuchem, the same symptoms can point to lots of different problems. I was determined to go into this one without any preconceived notions, but when the diagnostics turned up a faulty hard drive on the first run, I shrugged and ordered one sent in air express from the home office. I wasn't going to bang my head against the wall twice, either.

And now, with the problem determined so easily, I had a whole night to kill before the drive showed up. If you think I took advantage of the opportunity to go out on the town with Jeanette, or even to catch up on my sleep, dream on. Service reps don't do that even in the movies. What I did was tear the machine apart, anyway. Preventive maintenance, don't you know.

It turned out I spent most of the night with Jeanette and Rich anyway, simply by virtue of their spending the whole night in the lab. Their new computer was being stubborn about accepting their input, and of course they couldn't bag it and work on it in the morning because the hospital was full for the fourth week in a row and the same doctors who were pressuring them to get the system running were also running them ragged during the day with tests.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

It seemed that St. Vincent's wasn't quite so laid back as it had once been.

I finished my maintenance and left them there around three o'clock, then headed for my hotel and slept until nine that same morning when the plane carrying the new hard drive came in. I installed the hard drive and had the Compuchem back on line by ten, and began the long drive back home.

I had only an hour to go when I spotted the car with the hood up. The driver stood beside it with his thumb out, a patient, eventually-someone-will-stop expression on his face. Normally I don't stop for hitchhikers, but the guy was obviously for real. He had tools from one of those useless emergency tool kits scattered all over the fenders, his suit jacket hung from the antenna, he had his shirt sleeves rolled up, and he had grease up to his elbows. His thinning blonde hair looked matted on the sides, as if he'd been trying to brush it aside with his shoulder to avoid touching it with his hands.

I pulled to a stop behind his car. His was one of those late-model, aerodynamically smooth-looking ones that all look the same. "What's the problem?" I asked as I got out of my company clunker.

"Damiffino," the man said. He looked to be somewhere in his early forties, and not used to mechanicking under a car hood. "It started sputtering a few miles back, and then just quit. Acts like it's out of gas, but I'm sure it isn't."

I looked under the hood. It took me a minute to sort out the parts: smog stuff there and there and there, engine underneath it all; no carburetors so it must be fuel injected, which meant computer-controlled fuel timing as well as ignition timing in a model as new as this. The owner confirmed my suspicion.

"I don't suppose they give you a service diagnostics program with one of these, do they?" I asked.

"Hardly," he answered.

"Well, then, climb in and I'll give you a ride on into town. There isn't a whole lot we can do here."

"I guess not."

I helped him pack up his tools and transfer some of the stuff he didn't want to leave unattended into my car, and we headed on into Sacramento—my home base and evidently his as well. We asked the usual "What do you do?" questions and I learned that he was a software instructor for a computer store.

"Strangest job I've ever had," he said. "People come into the store to buy a computer—they don't even know why they want one until we tell them what they can do with it, then suddenly they have to have it right now. Don't have time to read the manuals, oh no; I've got to come set it up and get them going on it immediately."

"I know the type," I said, nodding.

He grinned. "It's crazy. Rather than take their time and learn what the computer is actually doing for them, they just want to know which buttons to push. They want to get every aspect of their business computerized at once, and before you know it they're getting less done in more hours than they were before. I've got places that've been computerized for almost a year and they *still* haven't gotten back up to speed."

"I just left a lab that's headed that same way."

"It's crazy," he said again. "Of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

course I should talk. I started this job thinking it would be a great way to learn a bunch of programs without having to buy 'em all, but it turns out I've barely got time to skim the manuals myself. I'm keeping just a jump ahead of our customers, and the more of them we get the less time I've got in the store."

"Every time somebody buys a new Compuchem, I get spread a little thinner, too."

"Yeah. I've been taking a portable computer home with me and trying to learn the programs at night, but my wife's starting to complain. You know how it is with computers; once you start working with them your time just seems to disappear. It's two or three in the morning before I know it, and she's waiting for me to come to bed, getting madder all the time. I've tried setting an alarm to tell me when to go to bed, but it seems like I barely get the power turned on before the alarm goes off. You know what I mean?"

"I hear you," I said. "I'm operating on about five hours of sleep a night, average, myself."

"It's nuts. Why do we do it?"

"The challenge?" I asked, not sure myself.

He rolled his eyes. "God knows. It's sure not the money, at least not for me."

I waved my hands to indicate the ancient, battered company car. He laughed, and I joined in. For the first time in weeks I felt myself relaxing in the company of a kindred soul.

When we got to the outskirts of town I dropped him off at a service station with two tow trucks outside and a big sign that advertised 24-hour towing. By the frazzled look of the people inside, I suspected that it might take them about that long to get the job done, but when we went in and talked with one of the attendants he claimed that he could get on the problem, "Just as soon as I get this damned computer to print me out an authorization form for the truck. I've got to have it for the insurance." I wasn't reassured, but my passenger smiled bravely and bid me go on. "It's right up my alley," he said. "I'll get him going in no time."

There didn't seem to be much else I could do, so I got back in my car and drove on home, only to find another pack of messages on my machine, including one from the office. East Lake's Compuchem had died again.

The home office hates it when a machine I just serviced goes right back down. I hate it, too. It almost always means I screwed up something while I was fooling with it, and that makes both the company and me look bad. The only way to recover from that kind of thing is to get it fixed right, and fast. I stared at my still-packed suitcase for a weary moment, picked it up again, and carried it back out to the car.

On the way past the service station, I glanced inside and saw the guy I had picked up earlier still there. He and the mechanic had the cover off the computer and were peering into its guts. From their stance, I could tell the prognosis wasn't good. I considered stopping in to offer my condolences, but I really didn't have the time.

"It worked just fine for the first day," Terry, the chief tech, said. I had gotten into town just at sunrise; Terry

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

had only beaten me to the lab by a few minutes. Now he looked over my shoulder as I called up the diagnostic program on the Compuchem. "We were getting caught up and everything," he went on. "Then it started to drop pills late every once in a while, and it kept getting gradually worse until now it won't hit the cuvettes at all."

I nodded. Same problem as before. I ran the diagnostics and got the same answer: hard drive malfunction. I could have kicked myself for not bringing another one with me this time.

"Boy, that's bizarre," said Terry. "Our reporting computer died yesterday afternoon, and it looks like it was the drive on that, too."

"No kidding?" I asked, only half listening. My other half was trying to figure why the skin on my hands and forearms had suddenly begun to tingle.

"Yeah. The service guy says it's a regular epidemic. He's been replacin' 'em all week."

"Huh," I grunted, still absorbed in my own thoughts. My hands were tingling more than ever, almost as if they'd gone to sleep. I lifted them from the keyboard and shook them to get the blood flowing.

Terry mistook the gesture. "Ah, the maestro's getting ready for the command performance," he said. "Well, I'll leave you to it."

My arms had quit tingling with the first couple of shakes. Maybe they *had* fallen asleep. The rest of me certainly felt like doing it. I got up and called the office to have them express me a new hard drive, then debated with myself for a couple of minutes over whether or not I should get a motel room and crash for a few hours while I waited for it to be delivered. Sense of duty won out over personal comfort; I knew something had to be causing all these hard drive failures, and if I didn't find it now I could expect to be back there every few days with a new drive until I did. I promised myself I would stack Z's for a full twelve hours just as soon as I got the C-chem running again, then started digging through the machine, one subsystem at a time, looking for clues.

I only found one, and I didn't realize it was a clue until later. I had already eliminated the obvious possibilities: power line disturbances and the like, and was digging through the mechanical parts most closely associated with the computer when I found a problem in the chain linkage running from the main electric motor to the cuvette transport mechanism. It acted as if the motor was slipping internally, somehow spinning faster than the sprocket on the other end. That could certainly affect the machine's timing, I thought, so I replaced it with another motor from my parts kit, smiling happily at my bit of luck in finding it when I did. The motor was right next to the computer and was normally a bugger to remove, but with the computer out to replace the hard drive I had plenty of room. I replaced it in half the time it usually took, tested the new one as well as I could without the computer to control it, tossed the old one in the dead parts box to take back to the shop, and continued my search for a reason why the machine had eaten two hard drives.

It was a pleasant day, actually. For once the East Lake lab wasn't busy, even though they were short both a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

chemistry analyzer and a reporting computer, so the atmosphere while I worked was one of relative calm. With the C-chem's computer out of the circuit I could only focus on the mechanical aspects of its operation, so for a few hours at least I had the chance to play the tinker, getting my hands dirty just as I had in the old days before any of the instruments were computerized.

By the time the replacement arrived, I had decided that the problem had, after all, been in the hard drives themselves. It had to have been. Everything else, with the exception of the motor I had replaced, was working perfectly, and I couldn't see how a slipping motor could influence a storage device. I couldn't see how two hard drives in a row could just spontaneously die, either, but that's what had to have happened.

I installed the new one, powered it up, and ran the diagnostic program. Everything checked out. East Lake's machine was back on line.

I hung around for a while just to make sure, and I noticed an interesting phenomenon. The lab's workload steadily began to pick up, especially in the chemistries. Blood bank, clear across the room, still existed in that lazy, situation-under-control state that had prevailed all day, but life in the chemistry department began to grow more and more hectic even as I watched. It wasn't just that the techs suddenly had twice the testing to do, though they did have that as they worked to reduce the backlog now that their star instrument was back in service, but it was more like they simply didn't have time to relax anymore. Even during the minutes while the C-chem was doing the job for them, they still found papers to shuffle and phone calls to make. Busywork.

The urinalysis bench, right behind chemistries, was also getting crazier, also without benefit of extra tests. It was as though proximity to the C-chem were making everyone nervous all of a sudden.

I strolled down the length of the lab away from the chemistry department, feeling tension drain out of me like a physical quantity as I did so. I turned around and marched back toward the C-chem, and by the time I reached it I was crawling with anxiety once again.

Terry looked up from scribbling a sample number into the log, saw me, and grinned. "Man, you look like you've seen a ghost."

"I feel like I have," I replied. I shook my head, but it didn't clear. "Whoo." I shook it again. "Damn strange. I—" I was about to say, "I think I'd better have a look at this thing again," but even as I thought it I asked myself, *Looking for what, gremlins?* I let out a deep breath, drew in another. "I think it's time I took a couple days off," I said.

"You deserve a few," Terry said as he turned to answer the phone. Three lines were blinking for attention at once.

So did he, I thought as I picked up my tool kit and headed for the door. I felt the C-chem's malevolent influence fading behind me, but I was aware of it, like the sensation that someone was watching me, for miles after I drove out of town.

The car was gone when I drove past the spot where I'd picked up the hitchhiker the day before. I wondered how

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

long he'd had to wait for the service station's computer to cough up the tow truck authorization form. *Computers,* I thought with a scowl. I knew I was being obtuse, but at the moment I couldn't think of a single instance wherein a computer had actually saved someone any time.

The answering machine was full of messages again when I arrived home. Rather than crash immediately I played through them while I brushed my teeth, and I got my reward: Diana had called again, this time leaving her number.

I dithered a while before calling. It was going on eleven o'clock; I could catch her in bed if she kept normal hours. Then I thought it through and laughed. Since when did anyone in the computer industry go to bed before sunrise?

She answered on the second ring. "Intellitronics, Diana speaking."

"Well hi. This is Kelly. Long time and all that."

"Kelly! Hold on a minute; let me save this spreadsheet. There. So, how've you been?"

"Busy," I said.

Her laugh was a whoop of sarcasm. "Hah! Who isn't? Got time for a drink yet tonight?"

I thought about it a moment. Did I? Sleep beckoned, but I was far enough beyond exhaustion that a few more hours would hardly matter. And I hadn't seen Diana in years.

"Dozens of drinks," I said with sincerity.

"I'm at the Sheraton. There's a pretty good bar at the top."

"HighBobs. I know the place. I'll meet you there in fifteen."

"Deal. Bye!" The phone went dead immediately. I envisioned her tapping madly at the keyboard already, getting in another few minutes of economic projection data or whatever she was calculating before she shut down to meet me. She hadn't changed a bit.

She had, of course. Eight years couldn't help but leave their mark. Just how much of a mark wasn't apparent until I stepped into the bar, glanced around to see if she was already at a table, and decided she wasn't. The only woman seated alone was older, in her late forties at least, and though she was obviously waiting for someone, the way she looked right through me told me it wasn't for me.

I took another couple of steps into the room to see if there might be more tables not visible from the door. There weren't any. The cocktail waitress was working the right side of the room; I decided to pick a table there and wait for Diana, but as I walked past the older woman I looked down, our eyes met, and we both gasped in surprise.

"Kelly!"

"Diana?"

She lurched up from her chair, threw her arms around me, and wrapped me in a hug I'd have killed for when we were in school together. I hugged back automatically, but the foremost thought in my mind was, *What happened to her? She's aged twenty years!*

I kept hugging her even after she was done, trying to collect my wits. When I was sure I had the shock erased from my face I let her go and looked into her eyes. *They* hadn't changed: green and sparkling as ever. And the gentle, fe-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

male aroma surrounding her was just as I remembered.

"Good to see you again," I said. We sat down. "So, what brings you to town?"

"I'm teaching a series of computer seminars on social modeling." Her voice was deeper than I'd remembered. Huskier. Did that come with the body? What could have happened? Had she gotten strung out on drugs? Amphetamines could do that to a person, I supposed, though it would take a lot of amphetamines. Some kind of bizarre disease? I caught myself leaning back while she said, "At least I *was* teaching seminars, until they called me back to Houston to bail out a company we've got a support contract with. They had a systems crash, and I had to babysit their data until we got them back on line."

I said, "Let me guess. They had a hard drive failure."

"Dead on!" she exclaimed. "How'd you know?"

"I've had three of them in the last few days. Two on the same machine."

She laughed. "Hard drives have always been the weak link in the system. The way they're packing more and more onto them timing gets to be critical. One little hiccough and out they go."

The waitress came by and we ordered, then there was a moment of silence while we just sat and stared at each other.

Diana broke it first. "So, you're into computers now, too, curse their little silicon hearts. How'd they get you?"

I wasn't sure she was kidding. I smiled anyway and said, "Subliminal messages in my magazines. 'Bow down before the great god Cyberon' and like that. Eventually I bought a portable to see what all the fuss was about, and got hooked."

"Poor Kelly."

Poor *me?* I thought. Poor Diana. "You sound like it isn't quite what you'd hoped for when we were in school," I said.

She shook her head. Salt-and-pepper curls bounced over her ears. That wasn't necessarily a sign of anything, though, I admitted charitably. I'd been getting a few gray hairs lately myself.

"It's not," Diana said. "Oh, it's exciting and I get to use my brain, but I wonder sometimes if I'm not using it *up*. I feel so drained all the time. Burned out."

"Do you, ah, do you suppose there's a medical reason for it?" I asked, trying to be tactful in asking the obvious.

"I wish. I thought I had Epstein-Barr for a while there, but there's no evidence of it. I'm just getting tired of the constant rush, rush, rush."

I remembered my thought earlier in the day and smiled a sardonic smile. "Computers were supposed to save humanity so much time; so what happened to it? Why does everybody with a computer feel like they're always short of time instead?"

She shook her head again. "Good question. Computers were supposed to eliminate paperwork, too, but you should see my office. Hell, you should see my hotel room, for that matter."

Our drinks arrived. I raised my glass in toast and said, "To old times."

"They're the only times we've got," she said as she clinked glasses with me.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"So tell me about Craig," I said. "Do I know him?"

"You mean Cliff? No. He was a programmer at my first job. He didn't make the move with me when I switched over to Intellitronics. No loss, really."

"Oh."

"How about you? Married? Did I offend your wife with my first message?"

I smiled. "No. No to both."

"Why not?"

"No time, I guess."

"Yeah, ain't that the story. No time for anything but the damned job. I tell you, if I had anything else I knew how to do, I'd chuck it all and start over. Be a waitress."

"I think I'd like to be a janitor," I said.

She nodded. "Here's to blue collars."

We drank, ordered more, and drank more. After half a dozen or so she invited me down to her room to check out her software. I felt a twinge of—what? panic?—at the thought of making love with Diana, but it wasn't enough to keep me from accepting. I had once had the hots for her in a big way, and no matter how old she looked now, she was still Diana.

Dawn was tinting the sky with the first hint of pink when we finally touched upon the subject. We'd been drifting in and out of sleep for a couple of hours, cuddling and snoring and occasionally giggling when we both awoke together. This time Diana stretched and sighed and said, "What a couple of old fogeys we are. If we'd have done this in college we'd still have been breaking bed slats at this hour."

"No risk of that now, eh?"

I'd meant it as a joke, but she didn't take it that way. She jerked back as if I'd slapped her, then buried her face against my chest. "Oh, Kelly, I'm sorry! What an unkind thing to say. You're not really old, no older than I am, I know that. It's just so hard to—"

She shut up suddenly.

"So hard to what?"

"To see you this way," she finished.

"What way?"

She raised her head and looked into my eyes, then looked away. "I've said too much already."

I nodded. "I get your drift anyway."

"You're—more mature. I remember a college kid. That's all. Neither of us are college kids anymore."

"No, I guess not."

I felt a sinking sensation in my stomach. *Me* old? Hadn't she looked in a mirror lately?

My bladder was about to burst. It wasn't the most opportune moment, but . . .

"Nature calls," I said, and slid out of bed.

Hotel rooms have mirrors in the funniest places. I stood there and watched my stream arc down into the bowl, then when I was satisfied with my aim I looked up to see how tousled a night of lovemaking had left me.

Pretty tousled, I decided. No wonder Diana had said what she had. And all that gray hair didn't help matters any. How long had I had that? Careful to keep splashing, I leaned forward and looked at my reflection. Jesus, I was

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

practically as gray as Diana! But I was only twenty-nine.

I straightened up again and considered my reflection. Had somebody dumped bleach in my shampoo as a joke? No, I finally admitted; I had been going gray for quite a while now. I just hadn't realized how bad it had gotten. The same for the wrinkles on my forehead; I had known they were there, but I hadn't stopped to consider what they meant.

I flushed the stool, went back out, and sat down heavily on the bed.

"You were right. I look like Father Time."

Diana rested her head on my shoulder. "No you don't. You look — distinguished."

"Shit."

"Kelly!"

"Sorry. But here I was feeling sorry for *you*, and I've evidently been denying the same thing for years."

"What same thing?"

"Huh?"

"Why have you been feeling sorry for me?"

I looked at her, the surprise written clear as words on my face, then I stood and brought her up with me. I marched her into the bathroom and in the harsh glare of the vanity lights I showed her what she had so recently shown me.

"You wondered if you had Epstein-Barr?" I asked. "There's a simpler word for our problem."

"Old age," she whispered into the mirror. "Good God, I look like a crone."

We stood there before the mirror, two naked old farts confronting our mortality. Diana finally said, "I guess it shouldn't be such a surprise. I've watched it happening all along, but I've been denying it, telling myself it's just fatigue, that I'd look fine if I just had the time to get in shape again."

I nodded. "I've been using words like 'prematurely gray' myself."

"Torching the candle at both ends; is that what did this to us?" She turned away and stumbled back to the bed, sat cross-legged and hid her face in her hands.

I followed her. "I don't know what caused it, but I know where to find out. I'm in the medical instrumentation business. I know every lab in five states around here, including the research labs. Somebody ought to know what's going on here."

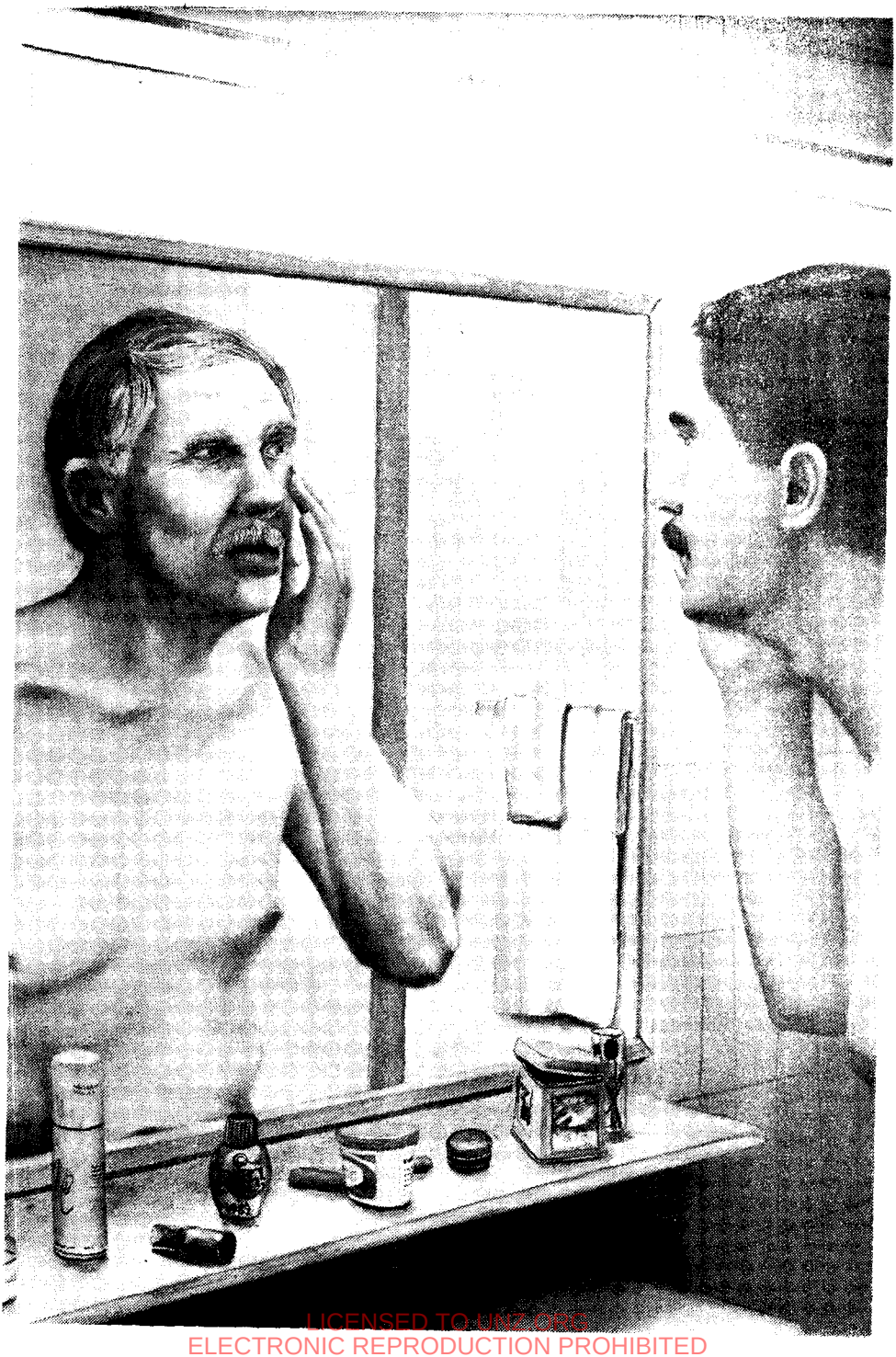
She looked up through an old woman's tangle of hair. "You think so?"

"I know so. Come on. Let's get cleaned up and find us a hospital."

"A geriatric ward, you mean," Diana said, but she got up off the bed again and headed for the bathroom to take a shower.

We learned much about the state of modern medicine in the next few days. First, that despite the shiny machinery and the exotic specialties, those who play god with our health know very little about the actual particulars of it. Second, that those who profess to know most are likely to know the least. And third, that even those who professed to know nothing could find nothing wrong with either of us. Besides, of course, that we looked half again as old as we really were, and even that didn't elicit the alarm in them that it had in us.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"People age at different rates," we were told, as if that explained it.

Our first hint of the cause came after we had used up all the time our employers would give us on such short notice and the ongoing crises in our respective fields forced us back to work. Diana had called in a replacement teacher for her seminars; now she sent her replacement home and took up the job again herself. I packed my suitcase and went to the office to see where they would send me next.

I had hardly walked through the door, however, when Greg, our shop manager, grabbed me by the arm and hauled me into his lair. I smelled grease and oil and burned electronics. Greg's shop is where we repair the parts that can be repaired without shipping them back to the manufacturer. "Recognize this?" he asked, pointing at a motor-and-chain assembly off a Compuchem. He had it up on the bench with the two sprockets facing us, the bicycle chain stretched tight between them.

"Yeah, that's a drive motor for a C-chem," I said. "Probably the one I took off East Lake's unit. Why?"

" 'Why?' he asks. Let me show you why. See these paint dots?" He pointed to a yellow paint dot next to one of the teeth on each of the two gears holding the chain tight. Both dots were in the twelve o'clock position. "Now watch carefully," he said, and he tapped instructions into a keypad on the bench. The stepping motor began to turn, pulling the chain, which turned the other sprocket.

"It works," I said. "Wasn't it defective?"

" 'It works,' the man says. Look at the paint dots."

I looked. The motor had turned exactly one revolution. The driven sprocket had turned just a little bit less.

I'd always thought the gears in the C-chem ran at a one-to-one ratio. Greg waited, arms folded, while I counted teeth on each gear. It *was* a one-to-one ratio. Yet the driven gear turned at a slower rate than the drive gear.

"How did you do that?" I asked. Our company had lured Greg away from a physics research lab when the lab had lost its grant; I assumed he was showing me one of the nifty tricks he had learned there. Not so.

"That," Greg replied, "is one hell of a good question. Now look at this." He reached up beside the motor and took down a fat, cheap digital watch on a red plastic band. He draped it over his wrist beside his own watch, also a digital but considerably more expensive-looking.

The cheapie said it was close to ten on Tuesday. Greg's watch had it right: nine A.M. on the same day.

"You need to set that," I commented.

"I did, last night before I went home."

"Then you need to slow it down. Isn't there an adjustment for that inside?"

"There is, and I made it. Twice. It keeps speeding up again. So does any other watch I try. But only when it's near the motor."

I rubbed my chin in thought. "Magnetic fields messing it up?"

"Do magnetic fields make two gears turn at two different rates like that?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"None I've ever heard of," I admitted.

"Me either." Greg spread his hands out in the universal gesture of defeat. "I don't mind tellin' you, this thing's giving me the willies."

I felt the hair standing up on my own neck. Accelerated aging was hard to prove, but a wristwatch running fast was something anybody could see. Nothing said there had to be a connection, but common sense told me there was.

"I've got another experiment I want to run on it today," Greg said. "But do me a favor. Pull the motor on the next machine that goes out on you. And save anything else that dies, too, OK?"

"OK," I agreed. "In return for one of your screwy watches."

"Done." Greg dropped the red-banded watch in my hand and gave me a slap on the back. I left his shop and went to check the job board for my next assignment.

I saw an unusually large number of broken down cars on the road that morning. I counted nine on the way to St. Vincent's, all late models and, judging by the tow trucks either en route or at the various scenes, all completely incapacitated. I saw gears turning at different rates, gears turning and digital watches running amok, and I wondered. What was the connection?

When I got to St. Vincent's I found their Compuchem not only down, but cratered. That's the technical term we service reps use for dead, ready to be embalmed and shipped to the morgue. There wasn't a single subsystem that checked out functional, either mechanically or through the diagnostic program. Even the program registered internal errors, just before the computer locked up for good.

Out of curiosity I pulled the access panel off the chain drive, triggered the stepping motor until it made one full revolution, and watched the sprocket on the other end of the chain spin only three-quarters of a turn. I pulled the fast watch out of my pocket, wedged it in next to the motor, and kept an eye on the seconds digits. Steadily, like an old-style locomotive picking up steam, they began to click off faster and faster until they were counting almost two for one.

But was it the motor, or something else? Gingerly, wondering—no, *knowing*—what was happening to my hand, I reached in and moved the watch over to sit on top of the CPU. There, only inches away from the computer's ticking heart, the seconds digits accelerated to a blur.

Jeanette had been looking over my shoulder. She laughed nervously. "Let me guess," she said. "Now the damn thing's screwing up anything else that comes near it."

I nodded. "That's exactly what it's doing."

"Not everything; just one thing in particular," Greg said when I made it back to the office that night. It had been a long trip. Abandoned cars had choked the roads the closer I got to town, and I'd had to weave my way around them, accumulating hitchhikers until my car couldn't hold any more. I'd driven a long ways out of my way to avoid the airport, too, after watching three planes in a row weave drunkenly in toward landing.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Now I stood before Greg, eyeing his latest experimental apparatus while he explained how it worked. It looked like a low-wattage laser and a beam splitter and a couple of mirrors to me. "It's basically the Michelson-Morley experiment, modernized," Greg said. "You shoot the laser down two different pathways, bring them back together, and look for interference patterns. Then if you change the speed of light in one of the pathways, the patterns change."

"Change the speed of light?" I asked. "I thought that was impossible."

"Not so. A piece of glass slows it down, thus." Greg slid a rectangle of window glass into the path of one of the thin red beams and pointed to the screen where the interference pattern took on a new shape.

"We've always known about that," he said. "Slowing down light is how lenses refract it. But what we didn't know is that you can speed it up, too." Greg moved the motor-and-chain assembly from the Compuchem alongside the glass, not in the beam's path, but near it. The interference pattern shifted back to normal, then beyond. "At first I thought it was just the motor, but that turns out to be a residual effect, not the cause. Computers are the real cause. You place a working computer near the beam—" Greg did so with a laptop unit, pointing at the interference pattern as he did so "—and it goes absolutely nuts."

It did just as he said, shifting dozens of wavelengths out of sync. He set the computer down near the beam and we watched the interference pattern continue to shift. "OK," I said, "so computers speed up light. What does that have to do with a dead Compuchem?" I asked.

"Timing, that's what," Greg replied. "Space and time are parts of the same thing. If the speed of light goes up, then that can only mean light takes less time to get where it's going. Why would it do that? Because there's less time to go around. Computers are using it up. And the closer something is to a computer, the more *its* time gets used up, too, so a motor right next to a computer has to turn faster, for instance, while a sprocket a few feet away doesn't. It screws up the timing."

"Using up *time?* How could they be doing that?"

" 'How?' you ask. You know what goes on inside these babies. Down in the heart of each and every one of them there's a processing chip screaming along at anywhere from three or four million to maybe a hundred million instructions per second. A hundred *million!* Can you imagine it? A light beam travels maybe ten feet during each operation, it happens so fast. And the processor's not the only chip in there, either. Memory chips have to be refreshed every few nanoseconds, and there's clock chips and coprocessors and all sorts of other stuff, too, all running flat out with the wind. All using up an increment of time for every operation."

"An increment? Of *time?*"

"Time's a quantum quantity, just like protons and neutrons and all the rest. According to one theory, anyway. The transfer particle is called a chronon. The theory assumes they can be created and destroyed just like any other particle, but that's evidently not the case. Chronons would explain perfectly the behav-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ior we see here, if you just make a different set of assumptions."

He waited, smug, until I asked, "What assumptions?"

"That there are a finite number of them, and they get used up as time progresses. And that we're starting to run out."

I had a brief mental image of Greg giggling hysterically as he set up this great practical joke, but my own aging and the cars on the road couldn't have been arranged, nor the feeling of frantic anxiety I had felt near the C-chem the other day. The same feeling I had now, come to think of it. I reached up and switched off the laptop. My tension seemed to ease a little, and the interference pattern ceased shifting. But it didn't start to reverse itself.

"Why us?" I asked. "Why now?"

Greg shrugged. "The chip at the heart of a Compuchem is the newest generation of processors yet. It's dozens of times faster than the nearest competition, and uses up chronons at a comparable rate. The guys who designed it didn't want it to be going obsolete overnight." Greg giggled, and he *was* a bit on the hysterical side now. "Of course, they didn't realize that 'overnight' would become a relative concept!" His giggle died away, and he said more soberly, "We were first because we didn't have much of a chronon reserve left anyway. The medical profession has always been in a race with time. When we switched to the new processor, we used up what was left just that much faster."

He sobered still further. "But we won't be the only ones to feel it. That same chip is at the heart of just about every new computer on the market."

"We aren't," I said. "Cars are dying all over on the highway."

That was news to Greg. "Cars are dying on the highway?"

"Like flies."

"Sure," he said after a moment's thought. "Most of them have computer-controlled ignition and fuel timing, and that's always been the weakest link in the system. If it's just a little bit off, the car doesn't run at all." He paused, frowning. "It's worse than I thought, though, if cars are dying. They should be moving through a veritable soup of free chronons. Computers all over the city must be reaching out for them from farther and farther away as they run out of their own." He sat down heavily on a stool. "Christ, this thing could be nationwide for all we know. We've got to do something."

"What? Call the National Guard?"

"If cars are dying on the freeway, they'll know about it soon enough."

"True."

I thought of Diana, teaching a seminar with fifteen or twenty computers humming all around her; all, no doubt, of the latest model. The way things seemed to be accelerating, she could be in her fifties by now.

"I know one thing we can do," I said.

Calling the National Guard wouldn't have worked anyway. The effect was spreading too fast. I couldn't even call the Sheraton, and they were only ten blocks away. But my company car was timed mechanically, not electronically; Greg and I dodged stalled cars all the way down the street, killed mine halfway up the parking ramp so it would

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

look stalled as well, and rushed inside the hotel.

The elevators were electronically controlled, of course. We took the stairs two at a time for the first couple flights, but slowed down to a steady climb when I felt my heart pounding. Old men have heart attacks on stairways, I reminded myself.

She met us on the stairs, coming down to rescue *me*. For once our timing was right, no doubt only because the rest of the world's was so far off. I gasped in relief to see her only a couple of years older than before.

"We've got to get out of here," I panted.

"Where?"

"Anywhere there aren't any computers." I turned, staggered back down the stairs with Greg and Diana's help, and stepped out the door into the parking lot.

The rusted-out hulk of a flashy new sports car rested under the carport in front of us. We stopped short, mesmerized by the eerie blue glow emanating from it. I squinted and looked through the glow into the car's interior, saw a desiccated mummy at the wheel, cellular phone in hand. On the dashboard rested a laptop computer, and in the passenger seat a portable fax machine had died in the act of extruding a sheet of printout.

The car, and its occupant, had run out of time.

"What makes it glow?" I whispered.

Greg's eyes were wide. "Cherenkov radiation," he said. "Photons losing energy as they speed out of the accelerated field near all those computers."

We were too close to them ourselves. I looked down to see my wristwatch counting away hours of my life. I wrenched it off and cast it away from me, and the moment it left my hand it glowed blue. Why hadn't it been glowing on my wrist? Because I wasn't dead yet, I supposed. I still had a little time left in me. But not enough to waste.

Greg's and Diana's watches made blue arcs after mine into the parking lot. We gave the glowing car a wide berth, climbed into my company car, and sped out of town. Actual moving traffic was light, but by the time we reached the freeway I was wearing sunglasses against the blue glow from all the stalled cars. We had to detour twice around multi-car pileups, but eventually we made our way into the suburbs, and then into open country.

We could feel relaxation seeping back into us as we drove. The other cars on the road quit jockeying for position, and we became a long row of refugees patiently making our exodus out of the radiant city.

I don't know how long we've been here in the mountain passes. Many moons. The actinic glow on the horizon has finally stopped spreading, and life has settled down to a manageable, if somewhat monotonous, routine of hunting and gathering. Not a bad way to spend one's twilight years, I suppose, though I still have a hard time convincing myself I'm an old man.

My bones remind me of it, though. I can feel storms coming if I concentrate. I feel one now, in fact, a swift-building ache in my arthritic wrist that presages a brief thunderstorm.

Or it might be just a satellite passing over. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the reference library

By Tom Easton

The World Beyond the Hill, Alexei and Cory Panshin, Jeremy P. Tarcher, Inc. (9110 Sunset Blvd., Los Angeles, CA 90069), $29.95, 704 pp.
Infinity Hold, Barry B. Longyear, Questar, $3.95, 281 pp.
The Stress of Her Regard, Tim Powers, Ace, $17.95, 392 pp.
Systems, W. T. Quick, NAL, $?, 251 pp.
The Coachman Rat, David Henry Wilson, Carroll & Graf, $13.95, 171 pp.
A Rustle in the Grass, Robin Hawdon, TOR, $3.95, 248 pp.
Children of the Wind, Kate Wilhelm, St. Martin's, $16.95, 256 pp.
The Bank Street Books of Science Fiction, Fantasy, Creepy Tales, and Mystery, Howard Zimmerman, Seymour Reit, and Barbara Brenner, eds., Pocket, each $3.95, ca. 190 pp.

I usually save nonfiction for the end of this column, but there are times when it seems a good idea to make an exception. This is one of those times, for I have in front of me **The World Beyond the Hill: Science Fiction and the Quest for Transcendence**, by Alexei and Cory Panshin. Alexei holds a Hugo for a critical study of Robert A. Heinlein and a Nebula for one of his novels. Cory, his wife, has collaborated with him on a novel and other critical works. Both are well known and respected in the field, and I hope I do no great violence to their views as I attempt to capsulize them for you here.

The World Beyond the Hill is a history of science fiction that should be of special interest to readers of this magazine. Its premise is that the age of science has taken the soul, the mystery, the ineffable, transcendent romance, out of Western civilization by correcting the religious worldview. Science said that all is, if not known, at least knowable without recourse to supernatural explanations. It said there is no heaven, no hell, no gods. It set humanity alone in

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a mechanical cosmos. And the human spirit has been struggling against this cold vision of reality ever since.

This struggle may be most visible in the development of SF. The first phase was sheer, unadulterated terror as writers saw scientists usurping the prerogatives of the gods. Here the Panshins set Mary Shelley (*Frankenstein*), Edgar Allan Poe, and others. Next came a timid embracing of the powers and potentials of science—Verne, Wells, and more. The embrace became less timid with Hugo Gernsback and the first true SF magazine, *Amazing*, but there remained a fascination, an obsession, with the more mechanical side of science. Only with the arrival of *Astounding* (now *Analog*), and under the influence of John W. Campbell, Jr., did writers come to feel truly comfortable with the new reality, to recognize that the universe has rules that apply everywhere and to everyone, to range at will through all of space and time, to contrive once more to set humanity at the pinnacle of creation, and to rediscover the long-lost transcendence. Only then could the Romantics ride again.

What makes the book of special interest to this column is its emphasis on *Astounding*: Campbell and his magazine enter roughly a third of the way into the Panshins's tale, and thereafter they do not leave it. The book ends right after World War II, with the comment that when Campbell finally bumped his nose against his limits, "the transcendent spirit underlying SF moved on. . . . But that is another story to tell."[1]

The Panshins have done a marvelous job of setting the development of SF in a context of developing science and technology. Yet complaints are inevitable. The simplest is that they often repeat themselves to make rhetorical points. They are thus so wordy that the reader may lose patience (I nearly did); certainly, the book could be considerably shorter and lose none of its strength, a point that was reinforced for me when I realized that even though my copy of the book was missing half a dozen pages, I did not feel any great lack of content. The book would also benefit from the removal of a thoroughly juvenile number of exclamation points, as in such lines as: "Wow! A girl who might be more than human within a drop of water!" or "[Verne's] *From the Earth to the Moon* ends abruptly with the . . . announcement . . . that the projectile has not struck the Moon as it was aimed to, but rather has gone into orbit around it. How strange! How mysterious!"

A more arguable complaint is that very emphasis on *Astounding* that makes the book worth discussing here. Yes, I love the magazine, and that emphasis gratifies me. But the Panshins indicate quite clearly that everything that was going on in the pages of other magazines, or in other countries, was of negligible importance. As a corollary, they vastly inflate the importance of some writers and stories, apparently for the sole reason that they appeared in *Astounding*.

Yet that does not render the book valueless. Bear its limitations and biases in mind, and you have a view of the development of SF that makes excellent sense. What more can you ask?

If I call Barry B. Longyear a junky and an alky, I get very uncomfortable. It sounds and feels like angry, downgrading name-calling, and I like the guy. Yet this is what he calls himself ever since he dried out and detoxed and

[1] If that sounds like there's a sequel in the works, well . . .

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

discovered Alcoholics Anonymous. He takes the recovery process, which requires admitting what one really is, very, very seriously indeed. He also puts a huge amount of energy into thinking about addiction and recovery, and that energy has now resulted in three books. The first was the autobiographical *St. Mary Blue*, which spelled out for all to see how far one can fall before entering treatment, and then the treatment process itself in all its pain and glory. The second was *The God Box*, in which he made the point that what addicts are most truly addicted to is their fears and anxieties: if they can beat the addiction and set those things aside, all the world is theirs.

The God Box was Barry's sermon to the fantasy reader. Now he has one for the SF reader. It's **Infinity Hold**, and it concerns a future when prison populations have burgeoned beyond all practical containment. The solution is to ship all the hard cases off to another world, inhabited only by felons, dominated by desert, as hard a case as any on two legs. There they may live as they wish; the rest of humanity piously washes its collective hands of them.

The tale begins in an American prison. Here Barry shows us the depths of human degradation, lent realism by heavy doses of prison slang, gaining relevance to Barry's own concerns from the prevalence in the "crowbars" of addiction to alcohol, drugs, power, sex, fear, and rage. Dump such people on an empty world, and it is not surprising that local "civilization" is a matter of predatory gangs that slaughter, loot, and enslave newcomers.

But now arrives a new shipment that is fortunate in its possession of a very few people who can rise above their addictions. They begin to craft a set of rules that amount to simple, fast, rough, fair justice in potent contrast to the complex, slow, unfair "justice" they have left behind. Slowly, there evolves a rational—though difficult to live up to—social contract based in large part on freedom from addictions of all kinds.

Does it remind you of Heinlein's "Coventry"? So be it. It was nifty then. It's even niftier now because Barry pours into it a heaping measure of personal significance.

The Muses are hard taskmistresses. They drive you to vast exertions. They sap your vitality. They force you to sacrifice all you hold dear—parents, spouses, children, life itself. They make of art an addiction that is most notable for the way it is neglected by those who concern themselves with alcohol, drugs, power, sex, fear, and rage. Barry Longyear, for instance, never mentions them.

Tim Powers does, in **The Stress of Her Regard**. Stepping back in time to the days of Shelley, Byron, and Keats, he tells us that poets in particular owe their art to strange beings known as the nephelim, or lamia, succubi, incubi, vampires. The nephelim share their nature with that of stone, yet they draw sustenance from human blood, they mate with humans, they engender strange hybrids, and they are vastly jealous of their human loves. What's more, their bite induces a sort of rapture potent enough to make many people crave it. These people identify those humans beloved of the nephelim by a certain look they have, and they follow them about, waving blood spotted handkerchiefs. In their dens, they hang those linked to the nephelim on crosses, tap their blood, and drink. For a science fiction writer of growing fame, perhaps they are emblematic of fandom.

In this situation, Powers introduces us to Michael Crawford, a physician on

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

his way to a wedding. Drunk, he slips the wedding ring onto the finger of a statue. Searching for the ring later that night, he finds the statue with its fist closed on the ring. In the morning, the statue is gone. And on the next night, his wedding night, *something* slaughters his bride most cruelly. Immediately suspect—who else, after all, could have entered the locked room?—he flees. In due time, he meets Shelley, *et al.*, and learns something of the truth. His sex life, of course, does not suffer at all.

The tale is one of desperate people seeking escape: Crawford from his vengeful sister-in-law, Shelley from his nephelitic twin and lover, both Shelley and Byron from the doom their supernatural loves lay upon their kind. Some escape is possible, but the artist who escapes the nephelim loses his art and soon enough once more accepts the dread embrace. No price seems too great to pay.

The tale's events are shaped by the sequence of events—the moves from Switzerland to Pisa to Venice to . . . ; the deaths of wives and children; the purchases of boats; the shipwrecks and deaths—that actually marked the lives of Shelley, Byron, and Keats.[2] Crawford and the nephelim fit into the undocumented cracks, and the nephelim serve as motivators for actions that must strike the modern scholar as less than fully explained. The result is a fast-moving, gripping parable of the artist's dilemma, his (or her) addiction to the artistry, the plague of the fans that can be escaped only temporarily by abdication and permanently only by death, if then. The sheer energy of the story makes me suspect that Powers feels this parable keenly. The same energy makes forgivable those inconsistencies and absurdities (such as the notion that the Alps have aluminum flesh beneath their rocky hides) that do not result from forcing the story to fit as closely as possible to documented history.

[2] As far as I can tell. I am by no means an expert in the lives of the classic poets, but the story feels as if Powers tried very hard to stay close to the biographical facts.

W. T. Quick has been considering the intersection of humanity and computers, of natural and artificial intelligence, and showing us the results of his thinking in such books as *Dreams of Flesh and Sand* and *Yesterday's Pawn*. Those results have been interesting and in some ways quite innovative, although he does not always follow through on the promises one book makes—or *seems* to make—for the next.

Did you expect that his next book would return to the cosmos of Arius, the Man in the Machine? The computers are there, and the hero makes his living as a "datahunter," but if the cosmos is the same it is at a time well before it is possible to build meat computers or construct anything resembling a cyberspace. Desktop computers can be as potent as our time's supercomputers, but they are used in much the ways that we are used to, except in one hotbed of underground computech, where there are hints of a future man-machine merger.

The book is **Systems**. If you take from the title the connotation that everything fits together with everything else, be assured that that is precisely what Quick means, even if the parts that must fit seem quite disparate. The first such part comes into view when a laser-powered air taxi crashes, killing the hero's wife and putting him in the hospital. Once healed, he begins trying to track down just what led to the systems failure that crashed the taxi. However, he finds that all the data trails he uncovers dead-end at a holding company called Con-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

dor. And then people start trying to kill him.[3]

Fortunately, Joshua Tower was once a man of violence, a government killer, secret agent, spy. He survives, recognizes the hand of his former employers, captures and grills a would-be assassin or two, and eventually—remember the underground computechies?—figures out what is going on, why secrecy is so important, and how to queer the pitch.

Systems quite competently delivers an entertaining amount of violence for those who dote on such stuff. There's that hint of man-machine marvels to come, which ties the book to Quick's other work, and there is suitable condemnation of unprincipled spy-masters and business manipulators, but there really isn't much for the rest of us.

West Germany, where the book was first published, has been raving over David Henry Wilson's **The Coachman Rat**. Readers have, in fact, made of it "a bestseller and cult book," says the jacket copy. "Profound," the press called it. "Humorous" and "magical" and "gripping" and "thought-provoking." "A ray of sunshine in the commercial jungle: entertainment with depth."

The book isn't horrible, but it isn't that great either. *The Coachman Rat* is the Cinderella fairy tale told from the viewpoint of the rat who got bibbity-booed into the coachman for the pumpkin coach. This rat, named Robert, has long been fascinated by humans and their ways, you see, and so he's on hand at the crucial moment. Sadly, after midnight he remains able to talk, he tells his tale around town, and he falls into the hands of a socialist demagogue, Devlin, who uses him to "prove" Cinderella guilty of witchcraft and stir up the populace to burn Cindy at the stake and behead her Prince. Said demagogue then moves into the palace himself.

The rat, Robert, quickly catches on to how he's been used. Bibbity-booed once more into human form, he learns to play the recorder and pipes an army of rats into action against the villain. Almost too late he twigs to the fact that rats—or armies—aren't terribly discriminating about innocent women and children and does his best to stop the inexorable flow of events.

The basic blend of ideas—Cinderella as seen by the rat; "happily ever after" as a highly temporary state of affairs; fairy tale aristocracy and romanticism giving way to modern socialism—is nifty enough. But why did the West Germans lap it up so enthusiastically? What did they find so "profound" about it?

Some reviewers have pointed to the resemblance of the story's revolution to the events of the French Revolution. I suspect that the resemblance that resonates with the West German psyche may have more to do with Hitler, who swayed people in two ways, with magic words (plain old demagoguery) and with magic voice (the music of the pipes). He is thus both Devlin and Robert, and the lesson is one that history has taught the Germans: It is best by far to shoot both demagogues and avengers in their cradles.

Or perhaps it's just that Europe has had so much more experience than we Americans with the destruction wrought

[3] That's a clue, folks. It's an absolutely *de rigueur* convention of certain kinds of storytelling that as soon as the hero begins to scratch his or her head because the villain has covered his or her tracks too well, said villain obligingly gets anxious, tries to off said hero, and thus guarantees that the hero—who survives, of course!—gets on the right track.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

by demagogues.[4] A tale that deals with such matters must speak more pointedly and more personally to them than to us.

Dodd, Mead first published Robin Hawdon's **A Rustle in the Grass** in 1984. Now TOR has made it available again, with a "Young adult" imprint on the spine, and sent me a copy. And a brief discussion of it fits rather nicely right after I've been talking about a book about a rat turned into a human. It is, you see, about people turned into ants.

Oh, not quite. These ants never were truly people. But the book does belong with all the others that treat animals as little people, with cute little names and cute little quirks and cute little problems. Rare indeed is the member of the category that avoids terminal cuteness.[5]

Hawdon has put a serious point on his tale—he wishes to tell his readers of the virtues of embracing life, risks and all, of dying gladly in defense of one's values, of seizing even desperate measures when otherwise all is lost. The context is that of a colony of little brown ants that gets wind of a much larger colony of larger slave-making red ants. The latter are despoiling all the countryside, and so the little browns send out a trio of brave scouts to learn all they can of the threat. Meanwhile, back at the hill, the workers are demanding a voice in the deliberations of the colony's ruling council, an aphid-bug tender is telling pithy stories, a rooster is attacking, a fly fisherman comes wading up the nearby stream to make camp and light a fire, and . . .

In some ways, the tale works very well, indeed. If a science fiction writer were to craft a parallel tale of innocent pastoralists versus rapacious predators, with the pastoralists winning out thanks to true pluck and a moment of genius that lets them take advantage of the negligent cast-off of some godlike passer-by, that tale would have to be one of aliens and cosmic battles and vastly superior Elder Kinds who from time to time, and with unpredictable results, show their presence. Such tales have been written. But Hawdon brings them down to Earth, shrinking their scale until they fit within the world we know.

Unfortunately, Hawdon's ants are totally unbelievable to anyone who knows anything at all about insects. For the purposes of the story, I can accept sentience in a brain smaller than a grain of sand. But council rule? The truth is more like cybernetic homeostasis with no central guiding intelligence at all. Ants that are universally "he"? Hawdon does, late in the book, make an attempt to salvage that sexist gaffe, as if someone had reminded him that worker and soldier ants are really all female, but still . . . Aphids that munch their vegetational food? Aphids are sap-suckers.

The politics is perhaps an essential part of the anthropomorphization so necessary to the story. But the other two are dumb mistakes of the sort that give "Young adult" fiction a bad odor. Writers should respect the facts with which they work as much for young readers as for older ones.

Genre fiction—science fiction, fantasy, mystery—allows some peculiar variations on story structure. To illustrate one such, let me tell you about Kate Wilhelm's **Children of the Wind**, a collection of five novellas. One of the stories, "A Brother to Dragons, a Companion to Owls," concerns a group of aged, sterile, mad survivors of a long-

[4] France and Russia, as well as Germany, come to mind immediately.

[5] Fortunately, such tales do not suffer from their affliction. They're insufferable.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ago war and their reactions when a band of savage children show up in their city; it is flawed because Wilhelm posits an unlikely testicular atrophy of the male children for no other reason than what she intends for the plot, but it is explicit and obvious SF. "The Gorgon Field" is obvious fantasy from the moment when the rich woman tells investigators Charlie and Constance about the stone pillars and the wizard who has bewitched her brother. "The Girl Who Fell into the Sky" is a tale of old ghosts and dusty evil illuminated by the parching sun of a southern summer.

But then there is "The Blue Ladies," in which a crazed painter, crippled by a stroke, insists on trying to paint one more of his famous ladies. Wilhelm's voice is that of realism, of the mainstream, but we know her as a writer of SF&F and we expect something to turn strange. And so it does, at the very end, when the introduction of the fantastic, by fulfilling our expectations, becomes a part of the story's resolution. Our expectations are also essential to the title story, in which a pair of six-year-old twins, besotted by an older cousin, prove oddly persuasive when they concoct a scheme to make the cousin and his friends look like fools. Does the supernatural play a part? We expect it to, and it may, but if we did not expect an element of the fantastic to appear at the last moment, we would not miss it. What Wilhelm has done is to make the story fantasy only by virtue of our participation in it. She is underlining the truism that readers make at least half of any story; here the readers add not only color and three-dimensionality and background—they also define the genre. The reader's expectations are important in any story that hews to a type. Consider mysteries, for example: the label tells you immediately that there will be a murder and that the murder will be solved. A "first contact" label tips you off that all those mysterious happenings really do mean aliens in the wings. The best writers, however, strive to escape the constraints of type or formula, and this is what Wilhelm is doing. She is playing with the tension aroused in you, the reader, by making you expect a certain kind of story and then not delivering immediately. She may or may not deliver eventually. Either way, she weakens your bondage to expectation. One result is then to free herself and other writers of the chains your expectations impose on them—the literary marketplace is such that writers who do not fit the pigeonholes of type or genre can have great trouble getting published, or making a living from their writing if they do get published.

Kate Wilhelm is a marvelous writer who chooses to fight the good fight in an admirably clever way. I applaud her. I wish her all success (though I remain doubtful that that success is attainable). And if you think I'm full of baloney, that doesn't really matter. Wilhelm's stories are grand regardless. Read them for that.

From Byron Preiss Visual Publications and the Bank Street College of Education come **The Bank Street Books of Science Fiction, Fantasy, Creepy Tales**, and **Mystery**, edited by Howard Zimmerman, Seymour Reit, and Barbara Brenner. Each is a collection of about a dozen mostly classic short stories converted into graphic (comic book) form. They are intended for kids but older readers may also find them interesting. The SF volume includes stories by Andre Norton, Brian Aldiss, Mack Reynolds, Leigh Brackett, Isaac Asimov, Damon Knight, H. G. Wells, Cliff Simak, and seven more. The fantasy

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

volume includes, among its dozen, Anne McCaffrey, Nathaniel Hawthorne, and Terry and Carol Carr. The creepy book offers Poe, Algernon Blackwood, Wells, Jack London, and seven more. The mysteries are from Poe, Asimov, David Morrell, Fredric Brown, Bret Harte, and seven others. The results vary from those graphic renditions that quite effectively capture a story as I remember it from long-ago reading to those that make me think nastily of the hazards of "reformating" the Mona Lisa as a cartoon. Poe's "The Tell-Tale Heart" is probably the worst offender. ■

Classified Marketplace

AN MAY/90

ANALOG/ISAAC ASIMOV combination CLASSIFIED AD rate is $6.50 per word—payable in advance—($97.50 minimum). Capitalized words 40¢ per word additional. To be included in the next issue please send order and remittance to I. M. Bozoki, Classified Ad Manager, DAVIS PUBLICATIONS, INC., 380 Lexington Ave., New York, N.Y. 10017.

BOOKS & PERIODICALS

100,000 science fiction and mystery paperbacks, magazines, hardcovers. Free catalogs! Pandora's, Box AA-54, Neche, ND 58265.

PUBLISH YOUR BOOK! Join our successful authors. All subjects invited. Publicity, advertising, beautiful books. Send for fact-filled booklet and free manuscript report. Carlton Press, SME, 11 W. 32 St., NYC 10001.

CATALOGS & DIRECTORIES

ANALOG CATALOG ON COMPUTER! Complete cross-referenced index to all fiction and fact articles published in ANALOG between 1960 and 1989. 13 different categories listed: Author, Title, Theme, Your Comments, etc. A must for ANALOG readers! (Requires IBM/compatible & hard disk.) To order, send $40.00 (check/money order) to: ANALOG CATALOG, Davis Publications, 380 Lexington Avenue, New York, NY 10017.

CATALOGS & DIRECTORIES—Cont'd

PIPES, TOBACCO, CIGARS, ACCESSORIES. Over 50,000 pipes in stock. FREE 32 page color catalog. Call Carey's Smokeshop Toll Free 1-800-99BRIAR.

STAINED GLASS starter kit. Send for free details. Astrosoft, 15006 La Mesa, CA 91342.

DRAGONS

DRAGONS! T-shirts, sculptures, stationery, jewelry and much more. Full-color Dragon Catalog - $2.00. Dancing Dragon - ANO, 1881 Fieldbrook, Arcata, CA 95521.

TAPES & CASSETTES

OLDTIME RADIO PROGRAMS. Great Science Fiction! Also, mysteries, comedies, westerns. Free catalogue. Carl D. Froelich, Heritage Farm, New Freedom, Pennsylvania 17349.

YOU'LL MAKE MONEY

SAVE MONEY TOO— BY READING and ANSWERING THESE CLASSIFIED ADS

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

brass tacks

Dear Stan:

I ran across this story too late for inclusion in "60 Astounding Years," but I think it is worth a mention. "New Apples in the Garden" by Kris Neville (July, 1963) was in a back issue of *Analog* that I picked up at Noreascon. It is set in the year 1981 and recounts a day in the life of a city maintenance engineer in Los Angeles. In the story, the urban infrastructure is falling apart —water mains bursting, cables shorting, phone service out, etc. Things in general are breaking down. Meanwhile, the budget crunch is forcing the city to cut back on "costs" (read "spending." Costs are something else), especially of "high cost" experienced workers. The problem is that entry level workers are so poorly educated that the repairs themselves are often defective. In the background, the stock market is setting new highs daily and one character wonders if another crash is imminent.

I'd say that Neville called that one pretty good, wouldn't you?

MICHAEL F. FLYNN

Dear Dr. Schmidt:

I read Rick Cook's article on Neural Nets (Aug. '89) with great interest. I'd like to respond to his comments on the dim prospects of building a net with human-like intelligence. The hardware won't be the problem. Hugo de Garis, in the summer '89 *AI Magazine*, suggests that by 2032 we should have brain-scale neural processors for $10,000. The hardware will be available to most of your readers within their lifetimes.

The software, that is, the training, is the problem. There seems to be an unspoken assumption among many that either of two simple strategies will suffice. (Please note that I expect Rick is sophisticated enough not to share this assumption.) The "just train it" strat-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

egy says that we first build a big enough neural net. Then we "just train it" like we train babies. The second strategy I'll call "evolve into it." It says that somehow, on the path to building bigger nets, we will discover what we need to know. So far, the two strategies seem to be working. Physics and neurological research are providing insight into perceptual tasks. Neural nets that recognize letters, chairs, tanks, etc. are being built. What about conceptual tasks? Will either of these strategies help us develop a neural net that recognizes truth, justice, and beauty? I don't think so, because first we will need a "physics" of concepts. Fortunately, there seems to be one in the making.

George Lakoff's book *Women, Fire, and Dangerous Things* looks like the beginnings of such a physics. His perspective is that of a field linguist —someone who studies the way people talk about things. Languages, especially in their unconscious aspects such as grammar, bear some sort of relation to the way their speakers think. Since this very old idea is still hotly debated, much of the book discusses the nature of this relation. But more exciting is his presentation of Experiential Realism. This theory explains human concept-systems as the result of applying our conceptualizing ability to preconceptual images and schematas. These preconcepts arise from our experience of being in the world, moving in bodies, manipulating objects, etc.

There is no single human concept-system. Concept-systems can vary dramatically among languages and cultures. Moreover, translation and understanding are fundamentally different —there can be translation without understanding, and there can be understanding with no possibility of a translation! This is because understanding is rooted in shared experience of cultural and physical realities.

Consider, as an example, Mixtec, an indigenous language of Western Mexico. In Indo-European languages, we conceptualize spatial locations via the grammatical system of prepositions and cases. X is on Y, in front of Y, etc. Mixtec speakers conceptualize spatial locations via a metaphorical projection of body parts onto objects. To say "The stone is under the table," you say something like "The stone is-located the table's-belly." This way of expressing location is systematic throughout the language; it is part of the grammar. To say that something is on a mountain, Mixtec speakers use a "head" metaphor. On the other hand, a roof needs a "back" metaphor. Translations into properly-formed English entirely miss the distinction.

We can learn Mixtec and understand it, but we can't really translate it into English. English-speaking people just don't organize their concepts of location that way (notwithstanding exceptions like "on the other hand"), although they can learn to.

This suggests that the two strategies for developing a human-like artificial intellect require some specific additions. The "just train it" strategy will require that we build a robot with a humanoid body and neural net brain. Then we will have to provide it with human-like physical experiences. Only then can we guide it in forming concepts that we can analyze and codify a particular conceptual structure. Then we can gradually train the neural net, making sure that it "gets" the structure we want. This strategy will carry a risk that the net will form concepts that we will not be able to understand.

By clarifying the passage from basic experience to higher concepts, Lakoff

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

may have provided a blueprint for the development of conceptualizing neural nets. But certainly, for science fiction writers, Experiential Realism is a gold mine. One of John W. Campbell's famous challenges was "Show me an alien [machine?] that thinks as well as, but differently from a human." We can now meet the challenge systematically, starting with the assumptions of physical form and basic experiences.

JOHN A.D. MAJOR

Rocky Hill, CT

P.S. Korzybski's extensional definition of a chair—something *intended* to be sat upon—is right. When Rick perches on the corner of a table and asks, "Fine, what's this?" the proper response is "That's a table, so get off it!"

The author replies. . . .

Dear Stan:

There are two reasons for thinking we won't be able to build a neural net that rivals the human brain in the next few decades, if ever.

The first is the problem of fabrication. We may be able to build chips that will have as many gates as our brains have neurons, but we probably won't be able to match the number of connections. Neurons typically have tens of thousands of connections per neuron and gates, especially on chips, have at most a couple of dozen. In neural nets the number of connections is probably more important than the number of active elements.

The second point is more subtle and potentially more important. Very briefly, the nature of the problem is such that it may be too complex for us to do, and there is an excellent chance we couldn't be sure we had done it even if we succeeded. We're not talking about something we could verify with a simple Turing Test.

There have been several articles related to this point in the *Communications of the ACM* in the last couple of years. I'd suggest that anyone who wishes to pursue the question start there.

RICK COOK

Dear Stan,

The story "Dancing with Myself," (August 1989) was one of the most subtle and horrifying stories ever published. However, it may have been too subtle, wasted as it was in a paint of ultimate good—the end to war, strife, etc. That paint added to the ultimate horror, for one had only to look a few months beyond the tale's ending to see the two possible *real* endings.

When the first sets of genetic matches to the heroine are born Orientals or blacks one would reasonably expect some *family* problems: "Who fathered these *white* children?" When the genetic identity of a series of these children is recognized—and there are plenty of people capable of coming close to the correct conclusion—there would be cries of "genocide." These calls would be true—for everyone's genetic heritage was (ultimately) in the process of being killed off except for the heroine's. In short order there would be massive pogroms to kill the carriers. If the exact methodology was not made public by the originators, it would be determined reasonably quickly by special investigators. There would be massive *killing* in third world countries of the infected and believed-to-be-infected. Eventually even the "civilized" world would break down and begin their own pogroms.

Assuming, however, that the situation did not occur as above, or that it did, but the "virus" won in the end. Then humanity would lie ready for the second terror. Perhaps it would happen quickly, perhaps after a few hundred or thousand years, but at some time the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

human clone will have an individual who runs into an organism to which it has no defences—whether bacteria or fungus (the two most likely candidates given the story's premise). Then the whole population will be at risk and the whole population might die. Remember—even with intense genetic variations and unfettered natural selection the black plague swept Europe while measles and smallpox devastated Oceania. With a monoclonal race billions could go in the time it takes to transmit a tuberculosis, leprosy, or plague bacillus—or worse, one of the parasitic fungi.

Gloom and doom indeed. Nuclear and conventional warfare's horrors at least allow some hope of an ongoing species.

WILLIAM MARSH

Ft. Lauderdale, FL

Dear Dr. Schmidt:

In the September "Alternate View" column G. Harry Stine suggests that no form of rail passenger transportation is viable. I'd like to take issue with some of his ideas. First off, virtually no transportation mode or facility of any size works without politics, governmental intervention, and public subsidy. In most cases there is little relationship between the cost of the facility and any "user fee" collected. Roads, airports, the air traffic control system, waterways, ports, truck terminals, bus terminals, and city transit systems all are involved with public financing. Much of the railroad system was given public incentives, such as land grants, for construction. Secondly, attractive alternatives to single person automobile trips are needed if city centers are worth preserving as busy economic areas. Whether they are worth preserving can be argued at length, but my premise here is that they are.

Public transit makes money only under very special circumstances. Is it therefore not viable? Should a city spend public money only on roads, parking garages, traffic lights and police, and not on buses and rail lines? Should federal money be spent for a freeway through a city but not on a light rail line or a busway? Some cities like New York, Chicago, and Philadelphia are flat out dependent on their transit systems. Even Los Angeles would be disrupted if the buses stopped running. Others, like Seattle or Cleveland, would be seriously hurt without transit. Many smaller cities and semi-rural areas subsidize transit even though the term "mass transit" hardly applies.

Some specifics: *Washington Metro*—This system has made a real difference to downtown Washington. Before Metro, middle-class workers drove in, parked, and didn't go out until it was time to go home because moving the car involved parking it again. Now people are going downtown on the Metro for shopping at lunchtime or after work.

San Diego—The Tijuana Trolley was built as a no-frills project at about $5 million a mile, and it's almost covering its operating cost with fares. Without it, Interstate 5 to the south would require four more lanes.

Amtrak—No argument, Amtrak doesn't make money and never will. But it is useful and the annual subsidy for the whole nationwide system, on the order of $600 million, is moderate. It serves over 500 communities. Between New York and Washington Amtrak is the largest single carrier. Systemwide, the trains run full much of the time, and Amtrak's number one priority is to get more rail cars to deal with overloading.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Miami—The elevated system built there may prove to have been a mistake. Probably Miami's biggest sin was to let their flacks broadcast an unrealistic projected ridership that came back to haunt them. But Miami is one poor performer against many winners among new urban rail systems: San Francisco BART, San Diego, Washington, Pittsburgh, Philadelphia-Lindenwold, Calgary, Edmonton, Sacramento, Baltimore, Buffalo, and Portland.

Buses—The Lincoln Tunnel's exclusive bus lane into Manhattan proves that buses can handle enormous volumes of people—about 80,000 in the peak hour in one lane. Buses on congested streets and highways aren't very attractive: why get out of your car for a journey guaranteed to be slower? Special roads for buses can make the difference. Pittsburgh has two busways which are very successful, speeding their riders around congestion in the narrow corridors available between the hills.

Pollution—I agree that transit can't begin to solve a nationwide pollution problem. But as you focus on the hot spots it does make a real difference. The New York metropolitan region has serious air quality problems, but the air would be far worse without the very large use its citizens make of trains and buses. Pedestrians and drivers on city streets don't like the smoke and noise from a bus, but it's far less than you'd get from 25 or 50 autos carrying as many riders. Some of San Francisco's buses are electric, and therefore the streets are more pleasant. The electric system costs more but citizens think the money is well spent.

Congestion—Build a new road: it fills up with cars and the city is as congested as ever. Build a new rail transit line: trains are full at rush hour, and the city is as congested as ever. With so many three-car families, cars will jam up anything you build. Transit riders, at least, are parking in the suburbs and bypassing the congestion. Rail lines don't inherently cost a lot more to build than highways, although a subway certainly is costlier than a country road. The politicians, planners, and bureaucrats love to gold-plate *any* project; they will do it if citizens let them. Mr. Stine says that trains are poor where people can have three cars and convenient, cheap airlines. Millions of Americans spend hours each day trying to drive a car on congested freeways. Even in the moderate densities of suburban areas and western cities, roads are not adequate for today's traffic and parking is a problem. How much do we want to tear down to provide more traffic lanes and parking lots? Who pays? And what about those who can not or should not drive? Transit isn't the whole answer to urban transportation, but neither is the car. And convenient airline schedules today are fairy tales. Our best bet is a mixture of transportation modes for different needs. Cars and airplanes are certainly needed, but so are buses, ferryboats, trolleys and trains.

JOHN P. AURELIUS

South Orange, NJ

Dear Dr. Schmidt:

G. Harry Stine's "Alternate View" *The Demise of the Toonerville Trolley*, had one useful point: if you plant a rail system in the middle of a city with a well-developed highway system, people won't change. Of course, had the urban planners done their job in the first place, perhaps the city would have grown up with a proper transit system. About 40 years ago, a road transportation consortium was convicted of deliberately buying up and destroying the Los Angeles light rail system. What if . . .?

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

He concentrates on the 1% of motorists who take the new rail systems in some cities. The commuter line that *I* take carries between 5,000 and 6,000 people in each direction, daily. The highway parallel to the track carries between 5,000 and 6,000 cars daily—say 8,000 people. That's a lot more than 1% in my arithmetic. Yes, the rail line receives a government subsidy. However, the government just spent $25 million to repair 20 years worth of wear and tear on that highway. Who would pay the cost of doubling the highway's capacity? Wouldn't that leave a grossly oversized highway outside the weekday rush hours?

His point that railways never pay is a red herring. In the real world, few major services pay their own direct and *indirect* costs. The concept of "user-pay" is a classic NIMBY—Not In My Back Yard. Important services and industries everywhere are government subsidized. The difference between the USA and the rest of the world is that you pretend the subsidies don't exist.

Do highway and gasoline taxes pay for the complete road system . . . and I mean the *complete* system? That includes land cost, construction, maintenance, access roads, major city streets (to take the cars off the highways), highway patrols, and (in these parts) cash for winter salting, sanding, and snow removal. To say nothing of the 50,000 annual deaths on American roads and highways—because any actuary will tell you that money has to be accounted for somehow.

Do airline tickets and taxes pay for the airports, air traffic system, and related infrastructure? Boeing complains that Airbus is heavily subsidized. Up here, a lot of what Boeing gets for military product development looks like subsidies for its civilian aircraft program. Besides, when Boeing bought de Havilland Aircraft for about $100 million, they didn't complain about a $500 million gift from the Canadian government: the development costs of the popular Dash 7 and Dash 8 commuter planes.

Imagine: railways are fit only for "poor civilizations that haven't yet progressed to the point where everyone who wants to own a car can have one. . . ." or for cities where railways "make sense but can never make money." Major German cities have their S-Bahn rail systems, which run with typical German efficiency. Germany is not a "poor civilization," and Germans love their cars. They also love their trains.

He describes a "special type of ridership" for urban rail systems—riders who use it "four to five days a week, going to and from the same location." No kidding. I call that "holding down a steady job."

JOSEPH ASPLER

Quebec, Canada

Dear Mr. Schmidt:

By focusing only on some bad examples, G. Harry Stine presents a very limited vision of what modern rail transit is about. For lower density areas, there are more effective solutions than traditional heavy rail rapid transit, most involving a mixture of modes. Light rail transit, the modern version of the trolley car, can run in subways, on elevated, on surface rights-of-way or even in the street.

Railways can't be moved, but feeder buses and vans to railway stations can; superhighways don't get moved around too often either. The most effective facilities for both cars and trains in heavy-volume corridors are ones which provide an exclusive or reserved right-of-way; they are expensive and fixed.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The original ridership projections for Miami were predicated on a major increase in the cost of gasoline and a large increase in feeder bus service, which didn't happen. The line was designed not to bring poor workers to the suburbs but to bring white collar workers to downtown and the booming Brickell Ave. employment area south of downtown. Ridership is higher on the more upscale line south to Dadeland than on the line north and west to Hialeah. The problem in Miami was not the choice of rail, but the choice of heavy rail; a light rail system on existing rail rights-of-way and in street medians could have served many more corridors for the same money.

Ridership on new light rail systems that have opened in cities such as Portland, San Diego, and Sacramento is strong and growing. The Portland line, projected to carry 3 million in its first year of operation, carried 7.2 million. In San Diego, light rail ridership has jumped from 11,000 to 30,000 per weekday since opening in 1981. In the Boston, Philadelphia, Chicago and Washington D.C. regions, commuter railroad ridership is growing at an average of 10% a year.

More people are living and working in the suburbs. New transportation solutions are needed there because suburban gridlock is growing and growing. Conventional mass transit may not be the solution, but neither is the auto.

Motor vehicle emissions are the biggest clean air problem, responsible for 75% of the nation's carbon monoxide, 45% of the oxides of nitrogen, and 33% of the hydrocarbons. Transportation contributes 25% of global greenhouse gases. The amount of oil consumed in transportation each year now exceeds total domestic petroleum production. Making cars less polluting and more energy efficient does not solve the problem if transportation and land use policies cause an increase in the number of miles they are driven. In addition, there is tragic annual loss of life in highway accidents.

Urban transportation systems and travel behavior vary widely, even among countries with similar per capita income, technology, and urbanization. Differences in travel behavior arise largely from public policy differences, such as auto taxation, variations in transit subsidies, land-use controls, and housing programs significantly influence travel choices, although sometimes only indirectly. It has been found that the success of public transportation depends more on supportive urban development and automobile taxation policies than on transit subsidies.

Mass transit is the choice in major urban areas around the world. Average gasoline consumption per capita in US cities is much higher than in cities around the globe. Can we continue to waste the world's energy resources and pollute the world's environment? Whether we like it or not, environmental pressures will force us to reduce gasoline consumption and automobile dependence through a reorientation of transportation and land-use policies. Urban and suburban areas are outgrowing the auto, so new transit solutions must be sought.

DR. STEPHEN B. DOBROW

Woodside, NY

P.S. His complaints about cost overruns, costs to taxpayers, programs done for reasons of politics and image, and the like could equally be applied to military programs, the space program, and all sorts of major government efforts. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a calendar of analog upcoming events

20-22 April
AMIGOCON 5 (Trans-Pecos area SF conference) at Embassy Suites, El Paso, Tex. Guests of Honor—Poul & Karen Anderson, Artist Guest of Honor—David Cherry. Registration—$15 at the door. Info: Amigocon 5, Box 3177, El Paso TX 79923.

27-29 April
NAME THAT CON 3 (St. Louis area SF conference) at Holiday Inn St. Louis-Downtown, St Louis, Mo. Guest of Honor—George Alec Effinger, Artist Guest of Honor—Todd Hamilton, Special Guest of Honor—Wilson "Bob" Tucker, Fan Guest of Honor—Laura LeHew, TM—Suzette Hadin Elgin. Registration—$20. Info: P.O. Box 575, St. Chalres MO 63301. (314) 724-0808 or (314) 946-9147.

4-6 May
CORFLU 7 (fanzine-oriented SF conference) at New York, N.Y. Registration—$5 supporting, $35 attending. Info: Lise Eisenberg, 99 Joralemon Street, Brooklyn NY 11201. (718) 624-0343.

11-13 May
HORRORFEST (Horror-fiction oriented conference) at Holiday Inn Denver, Colo. Guests of Honor—Chelsea Quinn Yarbro, Edward Bryant. Registration—$25. Info: Horrorfest, Box 7652, Riverdale IL 60627-7652. Include SASE (45¢).

18-20 May
MARCON XXV (central Ohio SF conference) at Hyatt Regency and Ohio Center, Columbus, Ohio. Guest of Honor—George R.R. Martin, Artist Guest of Honor—Gahan Wilson. Registration—$22 until 1 April 1990, $25 at the door. Info: Marcon XXV, Box 211101, Columbus OH 43221.

23-27 August
CONFICTION (48th World Science Fiction Convention) at Netherlands Congress Centre, The Hague, Netherlands. Guests of Honor—Joe Haldeman, Wolfgang Jeschke, Harry Harrison; Fan Guest of Honor—Andy Porter. Registration—$65 until 31 December 1989. Supporting—$28 until 31 December 1989. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: Worldcon 1990, Box 95370, 2509 CJ The Hague, Netherlands. Enclose sufficient International Reply Coupons for airmail response.

30 August-3 September
CONDIEGO/NASFIC (North American SF Convention) at the San Diego Omni Hotel International, San Diego, Calif. Guest of Honor—Samuel R. Delany, Fan Guest of Honor—Ben Yalow. Registration—$65 until 1 January 1990, $75 thereafter, $85 at the door. Supporting membership—$25. Info: ConDiego, Box 15771, San Diego CA 92115.

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Office six months in advance of the event.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The original ridership projections for Miami were predicated on a major increase in the cost of gasoline and a large increase in feeder bus service, which didn't happen. The line was designed not to bring poor workers to the suburbs but to bring white collar workers to downtown and the booming Brickell Ave. employment area south of downtown. Ridership is higher on the more upscale line south to Dadeland than on the line north and west to Hialeah. The problem in Miami was not the choice of rail, but the choice of heavy rail; a light rail system on existing rail rights-of-way and in street medians could have served many more corridors for the same money.

Ridership on new light rail systems that have opened in cities such as Portland, San Diego, and Sacramento is strong and growing. The Portland line, projected to carry 3 million in its first year of operation, carried 7.2 million. In San Diego, light rail ridership has jumped from 11,000 to 30,000 per weekday since opening in 1981. In the Boston, Philadelphia, Chicago and Washington D.C. regions, commuter railroad ridership is growing at an average of 10% a year.

More people are living and working in the suburbs. New transportation solutions are needed there because suburban gridlock is growing and growing. Conventional mass transit may not be the solution, but neither is the auto.

Motor vehicle emissions are the biggest clean air problem, responsible for 75% of the nation's carbon monoxide, 45% of the oxides of nitrogen, and 33% of the hydrocarbons. Transportation contributes 25% of global greenhouse gases. The amount of oil consumed in transportation each year now exceeds total domestic petroleum production. Making cars less polluting and more energy efficient does not solve the problem if transportation and land use policies cause an increase in the number of miles they are driven. In addition, there is tragic annual loss of life in highway accidents.

Urban transportation systems and travel behavior vary widely, even among countries with similar per capita income, technology, and urbanization. Differences in travel behavior arise largely from public policy differences, such as auto taxation, variations in transit subsidies, land-use controls, and housing programs significantly influence travel choices, although sometimes only indirectly. It has been found that the success of public transportation depends more on supportive urban development and automobile taxation policies than on transit subsidies.

Mass transit is the choice in major urban areas around the world. Average gasoline consumption per capita in US cities is much higher than in cities around the globe. Can we continue to waste the world's energy resources and pollute the world's environment? Whether we like it or not, environmen pressures will force us to reduce g line consumption and automobil pendence through a reorientat transportation and land-use p Urban and suburban areas are ing the auto, so new transi must be sought.

DR. STEPH

Woodside, NY

P.S. His complaints runs, costs to taxpay for reasons of poli the like could e military program and all sorts o forts. ■

c
Gu
Ed
Hor
765
18-20
MAR
ence)
192

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a calendar of analog upcoming events

20-22 April
AMIGOCON 5 (Trans-Pecos area SF conference) at Embassy Suites, El Paso, Tex. Guests of Honor—Poul & Karen Anderson, Artist Guest of Honor—David Cherry. Registration—$15 at the door. Info: Amigocon 5, Box 3177, El Paso TX 79923.

27-29 April
NAME THAT CON 3 (St. Louis area SF conference) at Holiday Inn St. Louis-Downtown, St Louis, Mo. Guest of Honor—George Alec Effinger, Artist Guest of Honor—Todd Hamilton, Special Guest of Honor—Wilson "Bob" Tucker, Fan Guest of Honor—Laura LeHew, TM—Suzette Hadin Elgin. Registration—$20. Info: P.O. Box 575, St. Chalres MO 63301. (314) 724-0808 or (314) 946-9147.

4-6 May
CORFLU 7 (fanzine-oriented SF conference) at New York, N.Y. Registration—$5 supporting, $35 attending. Info: Lise Eisenberg, 99 Joralemon Street, Brooklyn NY 11201. (718) 624-0343.

1-13 May
ORRORFEST (Horror-fiction oriented nference) at Holiday Inn Denver, Colo. ests of Honor—Chelsea Quinn Yarbro, vard Bryant. Registration—$25. Info: orfest, Box 7652, Riverdale IL 60627-. Include SASE (45¢).

May
ON XXV (central Ohio SF confer- t Hyatt Regency and Ohio Center, Columbus, Ohio. Guest of Honor—George R.R. Martin, Artist Guest of Honor—Gahan Wilson. Registration—$22 until 1 April 1990, $25 at the door. Info: Marcon XXV, Box 211101, Columbus OH 43221.

23-27 August
CONFICTION (48th World Science Fiction Convention) at Netherlands Congress Centre, The Hague, Netherlands. Guests of Honor—Joe Haldeman, Wolfgang Jeschke, Harry Harrison; Fan Guest of Honor—Andy Porter. Registration—$65 until 31 December 1989. Supporting—$28 until 31 December 1989. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: Worldcon 1990, Box 95370, 2509 CJ The Hague, Netherlands. Enclose sufficient International Reply Coupons for airmail response.

30 August-3 September
CONDIEGO/NASFIC (North American SF Convention) at the San Diego Omni Hotel International, San Diego, Calif. Guest of Honor—Samuel R. Delany, Fan Guest of Honor—Ben Yalow. Registration—$65 until 1 January 1990, $75 thereafter, $85 at the door. Supporting membership—$25. Info: ConDiego, Box 15771, San Diego CA 92115.

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Office six months in advance of the event.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

BOOKS PASS QUALITY TEST, COMMANDER. WHICH 5 DO YOU WANT FOR $1?

WITH MEMBERSHIP

SEE BACK PAGE FOR MORE BOOKS

1636 Pub. Ed. $18.95
Club Ed. $8.98

3756
Spec. Club Ed. $7.98

1263
Spec. Club Ed. $4.98

5876 *Swords and Deviltry, Swords Against Death, Swords in the Mist*
Spec. Club Ed. $7.98

0752 *Elric of Melniboné, The Sailor on the Seas of Fate, The Weird of the White Wolf*
Spec. Club Ed. $6.98

1172 *The Vanishing Tower, The Bane of the Black Sword, Stormbringer*
Spec. Club Ed. $7.98

HERE'S WHAT YOU GET WHEN YOU JOIN . . .

5 BOOKS FOR $1. Send no money now. You'll be billed $1, plus shipping and handling, when your membership is accepted.

A GUARANTEE OF SATISFACTION. If you're not 100% satisfied with your books, return them within 10 days *at our expense*. Your membership will be canceled and you'll owe nothing.

THE FREE CLUB MAGAZINE. You'll receive 14 issues of *Things to Come* a year. Each issue includes 2 Featured Selections plus a number of Alternates from the Club's library of almost 500 books. Twice a year, you may also receive offers of Special Selections.

SHOPPING MADE SIMPLE. To get the Featured Selections, *do nothing*—they'll be sent automatically. If you prefer another book—or none at all—simply return your Member Reply Form by the date shown. A shipping and handling charge is added to each order.

AN EASY-TO-MEET OBLIGATION. Take up to 1 year to buy 4 more books at regular low Club prices. Afterwards, you may resign membership anytime. Or you may continue to enjoy the benefits of belonging to *The Science Fiction Book Club*.

HUGE DISCOUNTS . . . up to 65% off publishers' hardcover editions. Some Club books are altered in size to fit special presses. All are printed on high-quality, acid-free paper.

RISK-FREE RETURN PRIVILEGES. If you get an unwanted book because your Club magazine came late and you had less than 10 days to decide, simply return the book *at our expense*.

THE Science Fiction BOOK CLUB®

MAIL TO: *The Science Fiction Book Club*
Garden City, NY 11530

YES! Please enroll me in *The Science Fiction Book Club* according to the risk-free membership plan described in this ad. Send me the 5 BOOKS I've indicated. Bill me just $1, plus shipping and handling.

Please write book numbers here:

Mr./Mrs.
Miss/Ms. _____
please print

Address _____ Apt. _____

City _____ State _____ Zip _____

ES644 38

If you're under 18, your parent must sign here _____

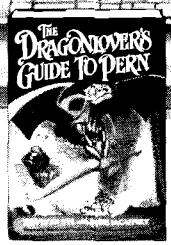
Members accepted in U.S.A. and Canada only. Canadian members serviced from Canada, where offer is slightly different. Sales tax added where applicable. We reserve the right to reject any application. ANL 5/90

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

TAKE CONTROL. GIVE US THE ORDER: SEND 5 FOR $1

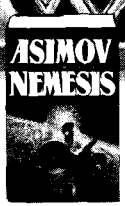
WITH MEMBERSHIP

Use the other side to tell us which 5 you want to join with!



3947 Pub. Ed. $19.95
Club Ed. $10.98

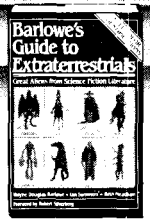
4911 Pub. Ed. $18.95
Club Ed. $5.98



4069 Pub. Ed. $18.95
Club Ed. $9.98

0893 Pub. Ed. $17.95
Club Ed. $4.98

0448 Pub. Ed. $24.95
Club Ed. $14.98



3814
Spec. Club Ed. $12.98

5462 Pub. Ed. $18.95
Club Ed. $5.98

1107
Spec. Club Ed. $7.98

3848 Pub. Ed. $14.95
Club Ed. $4.98

3624*
Spec. Club Ed. $6.98

2568†
Spec. Club Ed. $4.98

2311 Pub. Ed. $17.9
Club Ed. $5.9

2907 Pub. Ed. $18.95
Club Ed. $9.98

3970 Pub. Ed. $16.95
Club Ed. $7.98

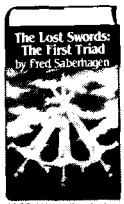
0695
Spec. Club Ed. $8.98

5355 Pub. Ed. $17.95
Club Ed. $4.98

3988 Pub. Ed. $18.95
Club Ed. $8.98

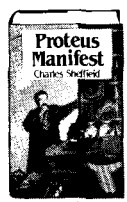
3616* Pub. Ed. $18.95
Club Ed. $5.98

1420 The First, Second and Third Books
Spec. Club Ed. $8.98



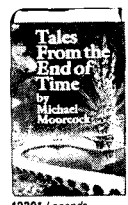
7260 *Woundhealer's Story, Sightblinder's Story, Stonecutter's Story*
Pub. Ed. $45.85●
Club Ed. $8.98

1842 *Dawn, Adulthood Rites, Imago*
Pub. Ed. $52.85●
Club Ed. $9.98



1438 *Sight of Proteus, Proteus Unbound*
Spec. Club Ed. $6.98

2303* *The Heir Apparent, The Warrior Lives*
Spec. Club Ed. $6.98



1230* *Legends, Messiah*
Spec. Club Ed. $6.98

SEE OTHER SIDE FOR MORE BOOKS

THE Science Fiction BOOK CLUB®

● Paramount publishers' editions may contain some text or language not suitable for persons under 18.

† Copyright © 1989 Paramount Pictures Corporation.
All Rights Reserved.
STAR TREK is a Registered Trademark of Paramount Pictures Corporation.

LICENSED TO LINZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED